FEBRUARY, 1945

Railway Engineering and Maintenance



IMPROVED HIPOWERS IMPROVE TRACK

Traffic is still tremendous—under the impact of heavily loaded freights and speedy passenger trains, track *must* be *well maintained*.

Improved Hipowers are helping more and more to do this job.

TENACITY

Reliance
HY-CROME
SPRING WASHERS

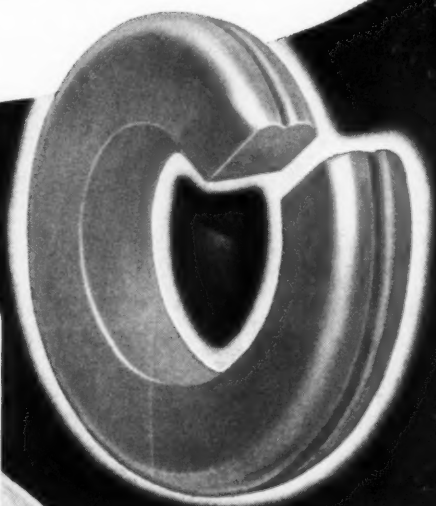
● Sometimes it's enough to just hold *tight* in a tough spot, but there are also places where a *reaction*, a readiness to fight back hard, is most important!

Railway maintenance men will be quick to see in this text a service lesson for track spring washer applications. The more progressive maintenance-of-way men have already recognized the need for a superior tension and non-fatiguing reactive pressure in track washers, and specify Reliance

HY-PRESSURE HY-CROME

Spring Washers to beat bolt looseness. Reliance Hy-Pressure Hy-Crome spring washers fight back with more spring tension than the A.R.E.A. requires and hold bolts tighter longer. Look for the identifying "Edgemark of Quality" on every Hy-Pressure Hy-Crome Spring Washer.

"TENSION THERE IN SPITE OF WEAR"



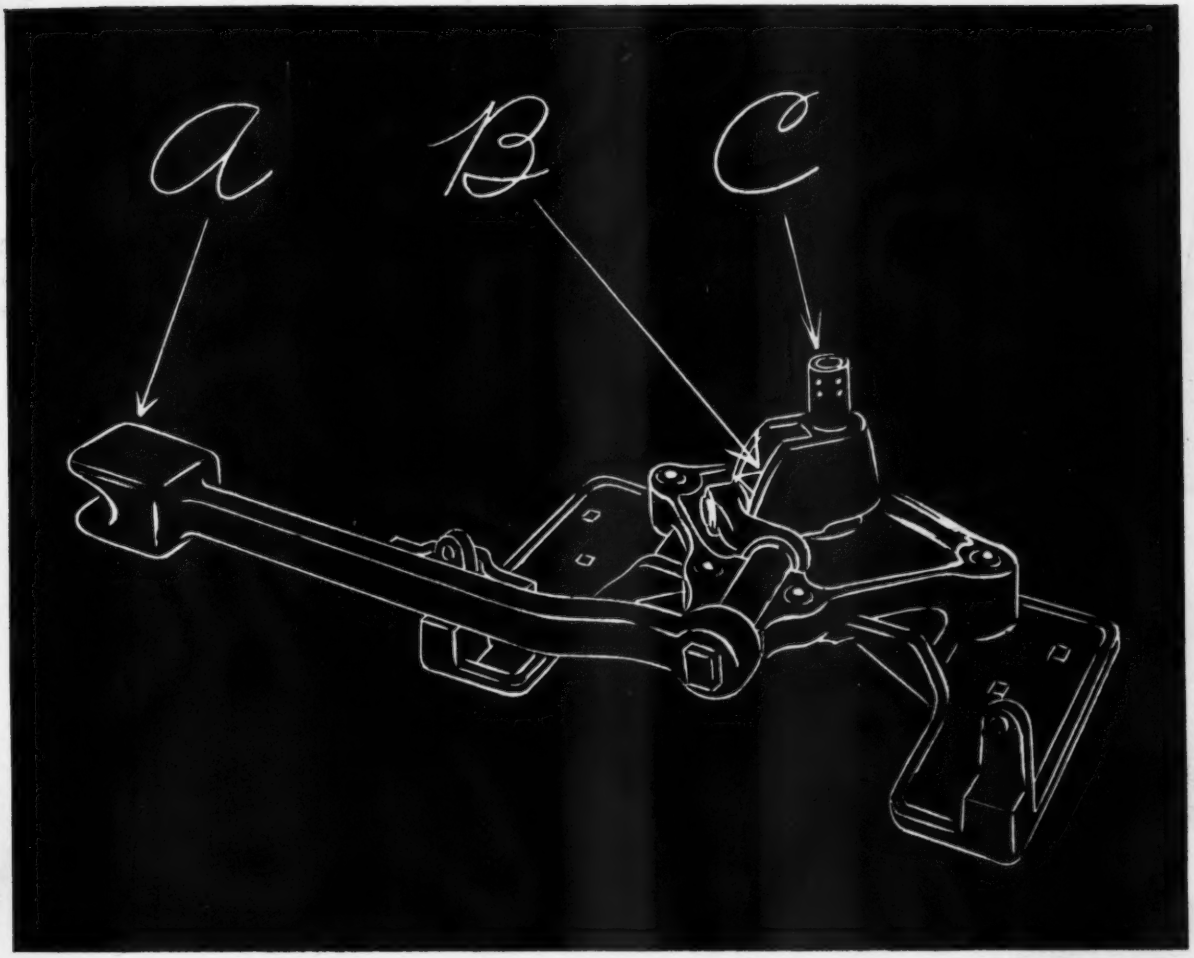


Write Today

for the six page illustrated folder on "Reliance Hy-Crome Spring Washers for Track Applications.

EATON MANUFACTURING COMPANY
RELIANCE DIVISION MASSILLON, OHIO
Sales Offices: New York • Cleveland • Detroit • Chicago • St. Louis • San Francisco • Montreal

Simple as A-B-C



The very simplicity of Bethlehem's Model 53 Switch Stand is largely responsible for its trouble-free operation. Only three moving parts are used —the throwing lever (A), the sliding block (B), and the spindle (C). The complete absence of complicated mechanisms is the best guarantee of easy, positive action and of low maintenance.

When the lever is lifted, the sliding block moves in the grooved portion of the spindle collar. This action rotates the spindle and transmits ample power to the crank.

The sliding block is of heat-treated alloy steel. If any wear should occur after long service, the block can be turned 90 degrees, bringing two unworn surfaces into use.

Because of its simplicity and all-around sturdiness, the Model 53 is a highly practical switch stand for main-line and heavy yard duty. The soundness of its design has stood the test of years . . . the test of heavy service on some of the country's greatest railroads.

Ask a Bethlehem engineer for more details.

★ ★ ★ BETHLEHEM STEEL ★ ★ ★

Published monthly by Simmons Boardman Publishing Corporation, 105 W. Adams St., Chicago 3, Ill. Subscription price: United States and Possessions, and Canada, $2.00; Foreign, $3.00. Single copies 35 cents. Entered as second-class matter January 20, 1933, at the post office at Chicago, Ill., under the act of March 3, 1879, with additional entry at Mount Morris, Ill., post office. Address communications to 105 W. Adams st., Chicago 3, Ill.

MODERN POWER REQUIRES
Modern Track Maintenance

Along with other lines, the Missouri Pacific makes effective use of Woolery Weed Burners to aid in maintaining weed-free track—an aid to the handling of war-time traffic.

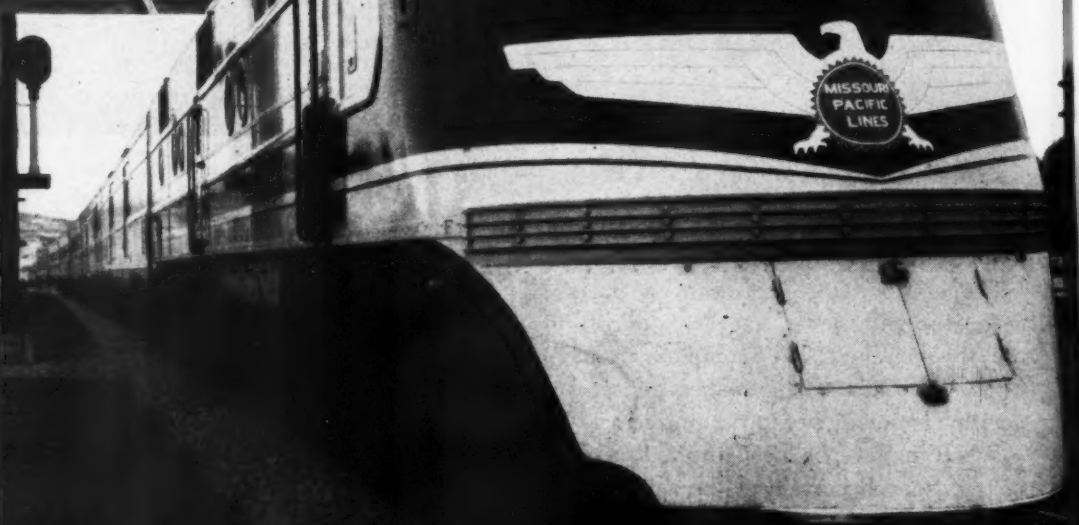
In fact, the use of Woolery Tie Cutters and Creosote Sprayers, as well as Woolery Weed Burners, by more than 75 railroads gives evidence of the advantages of employing this equipment.

WOOLERY WEED BURNERS are available in 5-burner, 3-burner, 2-burner and 1-burner models.



A SOLID WALL OF FLAME 25 FEET WIDE

Giant Octopus Model with 5 burners for main track



WOOLERY MACHINE COMPANY

MINNEAPOLIS — Pioneer Manufacturers of — MINNESOTA

RAILWAY MAINTENANCE EQUIPMENT

RAILWAY WEED BURNERS • MOTOR CARS • TIE CUTTERS • TIE SCORING MACHINES • RAIL JOINT OILERS • CREOSOTE SPRAYERS • BOLT TIGHTENERS

EXCLUSIVE EXPORT REPRESENTATIVES: PRESSED STEEL CAR COMPANY, INC., PITTSBURGH, PENNA.

HOW TO MAKE BETTER TOOLS FOR YOU

as DEMONSTRATED by WARREN TOOL'S Johnny the Hammerman



★

Hand forging is the accepted way of making the best tools.

But you don't forge a good tool by simply shoving a bar of hot metal under a hammer. It takes many, many years of experience to develop a high rate of speed, to know how many blows to strike, how heavy or how light the blows should be, and the many other "tricks of the game."

★

Johnny, one of Warren Tool's many experienced hammermen, has been on the job for 21 years. He knows how to handle the helve hammer to develop not only uniform section but a good structure.

★

That's why the Devil and Warrenteed lines of Warren Tools measure up to the high quality standards. In every manufacturing step, Warren Tool has the facilities and the craftsmen to produce dependable, long life, and safe tools for you.

CARBON STEEL

ELECTRIC FURNACE ALLOY TOOL STEEL

NOTICE

Since December 1, Warren Tool Corporation sales offices have been located at 2119 Bankers Building, 105 W. Adams Street, Chicago 3, Illinois. Address inquiries, orders, and sales correspondence to the new address.

WARREN TOOL CORP. • WARREN, OHIO

Announcement

Cletrac joins OLIVER

The acquisition of "Cletrac" by The OLIVER Corporation proves the importance with which the corporation views the manufacturing and marketing of tractors for industrial and construction needs. To meet the requirements of these users, an Industrial Division of the corporation has been established.

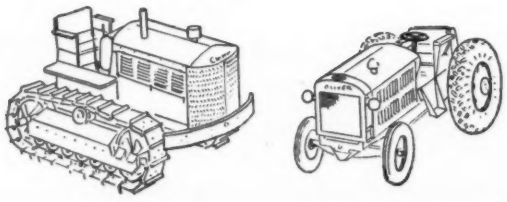
The Industrial Division of The OLIVER Corporation will have its headquarters at 19300 Euclid Avenue, Cleveland 17, Ohio. In addition to the well known "Cletrac" line of track-type tractors and allied equipment, the Industrial Division will also have in its charge, sales and service of industrial tractors of the wheel type now in development as well as other industrial products long manufactured by The OLIVER Corporation.

"Cletrac" Tractors for agricultural service will be handled by the Agricultural Division of The OLIVER Corporation, 400 West Madison Street, Chicago 6, Illinois.

Bringing to "Cletrac's" already ample research, engineering, manufacturing and service the corresponding facilities of The OLIVER Corporation, means that a complete line of even better "Cletracs" will be manufactured in the future and that service to "Cletrac" owners will be enhanced.

The dealers who sell OLIVER "Cletrac" Tractors are now in a position to serve you more completely than ever. The OLIVER Corporation, 400 West Madison Street, Chicago 6, Illinois.

The OLIVER Corporation



THE RAILROAD MAINTENANCE-OF-WAY MANS' DREAM!





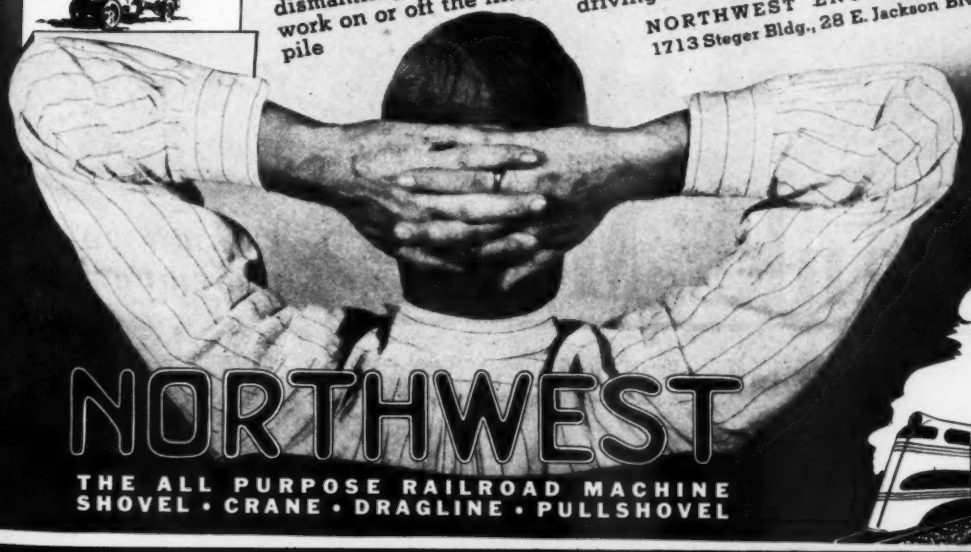
Loads itself under its own power on one flatcar or can be loaded on regular highway trailer. Travels through drop-end gondolas or from flatcar to flatcar. Works from gondola or flatcar. Handles clamshell, orange peel, tie and rail tongs, log grapple, sling, pile driver, steam hammer, pile puller, dragline, bucket and magnet, and it is convertible to a shovel or pullshovel by simply changing booms.

With a Northwest Crawler Crane you are equipped to handle rail laying or dismantling, bridge timbers, drainage work on or off the line, culvert work, driving or pulling, bank trimming, ditching and building out shoulders, spreading ballast, loading stores or scrap, unloading trucks or cars, digging ballast in the pit and do all the hundreds of digging and lifting jobs that are daily requirements in railway operation.

There is a Northwest of the right capacity for almost every problem and with Northwest comes many exclusive features that makes it faster and more productive on the job.

We'd like to tell you how many of the leading railways are using them and give you details on Northwest advantages.

NORTHWEST ENGINEERING COMPANY
1713 Steger Bldg., 28 E. Jackson Blvd., Chicago 4, Ill.



NORTHWEST

THE ALL PURPOSE RAILROAD MACHINE
SHOVEL • CRANE • DRAGLINE • PULLSHOVEL

PROVED on the nation's LEADING RAILROADS



A 25,000-Gallon Drink...

Quick!

LOCOMOTIVE 4007 is thirsty with a thirst that only 25,000 gallons of water can quench. A Fairbanks-Morse 12A Sheffield Standpipe does the job with the speed, efficiency and convenience demanded by today's railroading.

The Sheffield 12A has a telescopic spout that gives wide lateral and vertical range... convenient levers that permit rotation from ground or tender... operating rods that are easily adjustable... springs that eliminate shock... large roller that steadies spout... all rods outside of pipe, to provide easy adjustment.

In addition, this standpipe automatically locks from ground or tender... has no cable sheaves to clog with ice... rotates easily. Made in 8", 10", and 12" sizes, with capacities up to 6,000 g.p.m.

Since 1880 Fairbanks-Morse has supplied railroads with standpipes that are reliable, safe, and economical. Today this equipment is helping railroads meet the biggest schedule in their history.

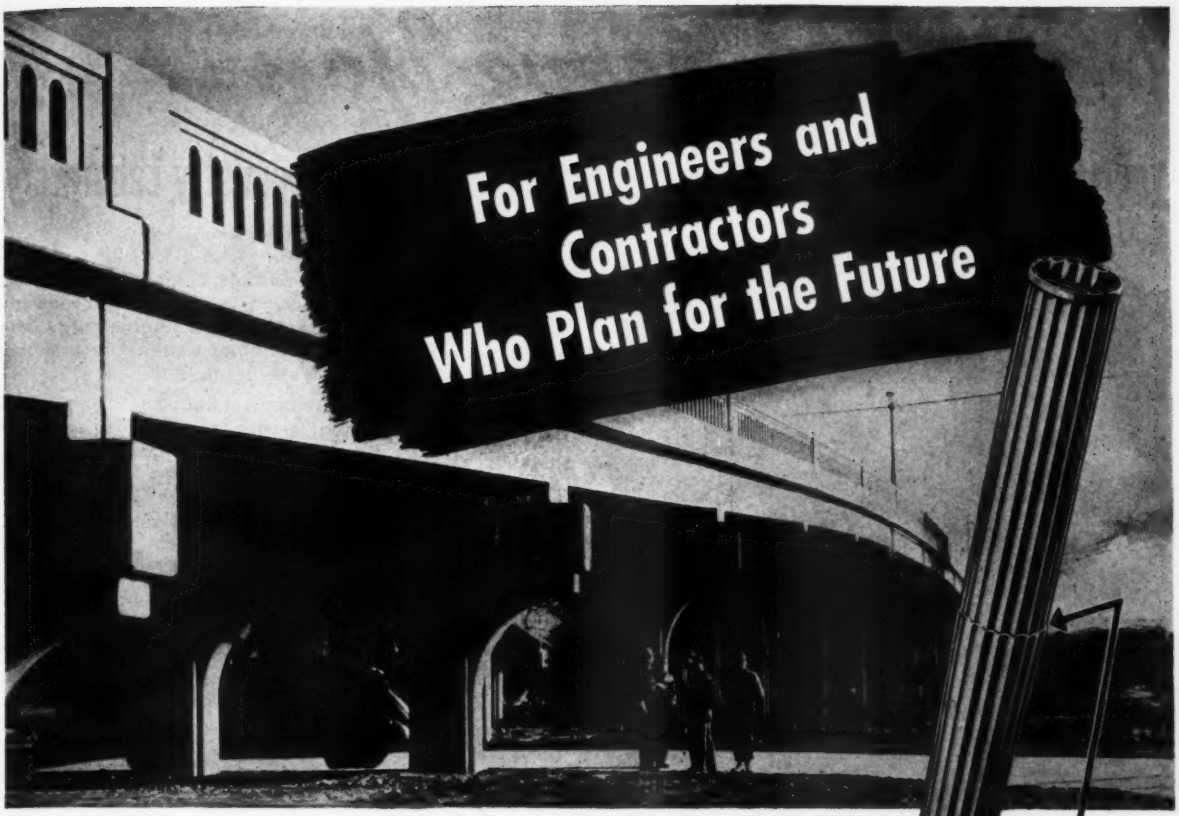
Fairbanks, Morse & Co., Fairbanks-Morse Building, Chicago 5, Illinois
Canadian Fairbanks-Morse Co., Ltd., Montreal



Fairbanks-Morse

A name worth remembering

Diesel Locomotives • Diesel Engines • Generators • Motors • Pumps
Scales • Magnetos • Stokers • Railroad Motor Cars and Standpipes



THESE four special Monotube features will make the installation of piled foundations for bridges, highway overpasses, marine construction, airports, and large buildings easier than before:

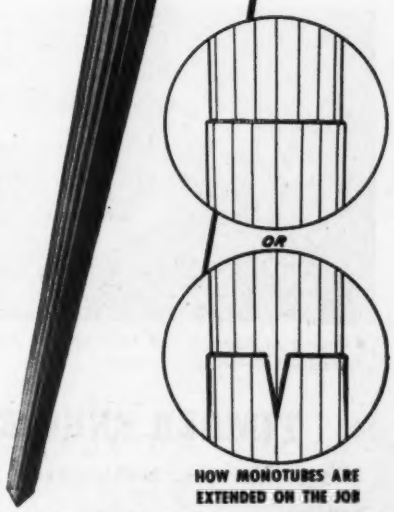
✓ **HANDLING** — *Monotube lightness, makes for fast, economical, easy handling.*

✓ **DRIVING** — *Monotube tapered fluted construction, combined with great structural strength, permits faster driving—without heavy core or mandrel.*

✓ **EXTENSION** — *Extendible Monotubes can be quickly and easily extended on the job to meet the requirements of varying soil conditions.*

✓ **INSPECTION** — *Monotube tubular design permits fast, sure inspection prior to concreting.*

Speed your first postwar project . . . make your work easier, more profitable with Monotubes. Available in a gauge, size, and taper to meet all your needs. Send for Catalog 68A. The Union Metal Manufacturing Company, Canton 5, Ohio.



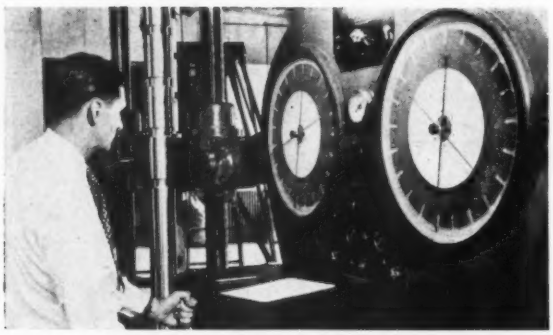
HOW MONOTUBES ARE EXTENDED ON THE JOB

UNION METAL

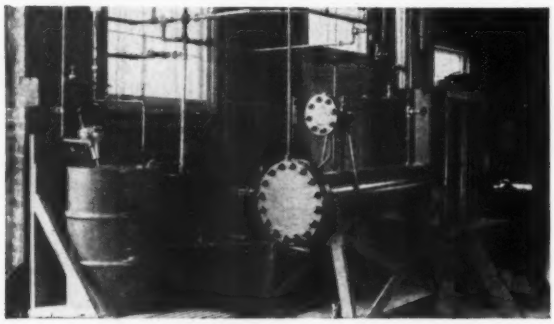
Monotube Tapered Piles

Ready to Serve You...

TECO Wood Products Development Shop and TECO Wood Chemistry Laboratory



● 200,000 lb. Baldwin-Southwark Hydraulic Testing Machine for tension compression and bending tests on wood.



● Autoclave for Pressure Treating Woods with chemicals and preservatives, Automatic Mixer at left.



● Director of Research and Chief Chemist discuss wood chemistry problem in Teco Chemistry Lab.

More than 200 government officials, engineers, architects, building officials and representatives of the lumber industry attended the formal opening of Timber Engineering Company's Wood Products Development Shop and Wood Chemistry Laboratory at Washington, D. C.

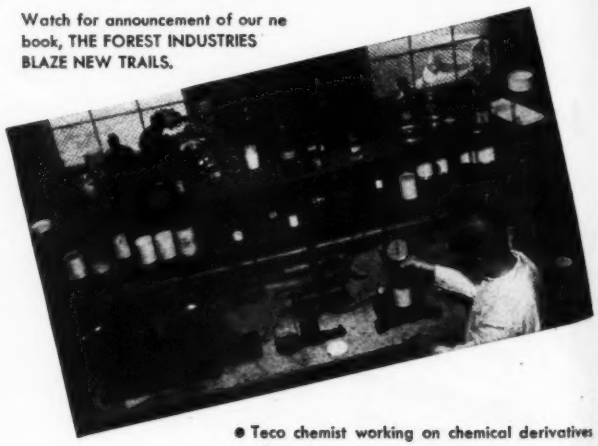
The Wood Products Development Shop has a 200,000 lb. Baldwin-Southwark testing machine; a testing rig equipped to handle trusses up to 50' span; autoclaves and other equipment used in pressure treating; dry kiln and high pressure steam equipment for impregnating; and other facilities for determining the physical and mechanical properties of wood and wood products.

The Wood Chemical Laboratory has modern equipment for investigations in wood chemistry and wood derivatives research. It is giving special attention to lignin research including adhesives, synthetic plastics, etc.

If you have any problems in respect to the physical, mechanical and chemical properties of wood, the technical staff of the Timber Engineering Company may be of assistance on a moderate fee basis. If its own facilities will not solve your problem, it will assist you in locating sources which can.

Consultations at our Washington office may be made by appointment and without obligation on your part. Write us on your business letterhead stating your wood utilization problem.

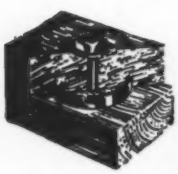
Watch for announcement of our ne book, THE FOREST INDUSTRIES BLAZE NEW TRAILS.



● Teco chemist working on chemical derivatives of wood.

TIMBER ENGINEERING COMPANY OF WASHINGTON, D. C.

WASHINGTON ▼ CHICAGO • NEW ORLEANS • SAN FRANCISCO



Specify **TECO**

CONNECTORS AND TOOLS

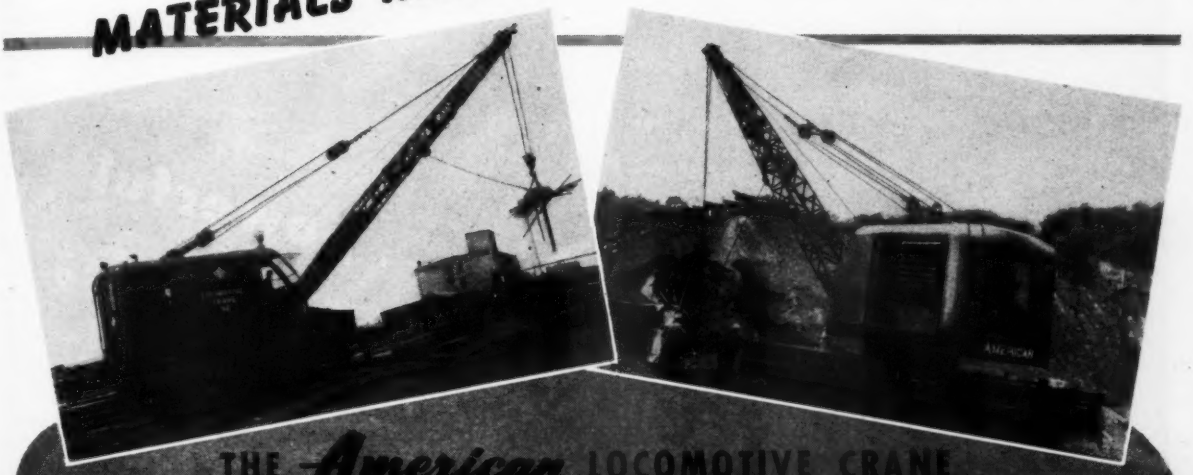
Endorsed by Leading Lumber Manufacturers and Fabricators

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American

MATERIALS HANDLING FOR RAILROADS



THE American LOCOMOTIVE CRANE
MATERIALS HANDLING METHOD

FOR
YARDS AND STORES
MAINTENANCE OF WAY
WOOD PRESERVING PLANTS
CONSTRUCTION WORK

The AMERICAN Locomotive Crane was designed for just this variety of materials handling work. Scattered over the country with the nations leading railroads, their mobility, ease of operation, simplicity of control, have demonstrated that they are an efficient materials handling method for bucket, magnet, and hook work. They make the use of old machines and other methods costly and wasteful by comparison.

Under your jurisdiction is materials handling that can be done better with an AMERICAN Locomotive Crane. Now is the time to look into it.

4507

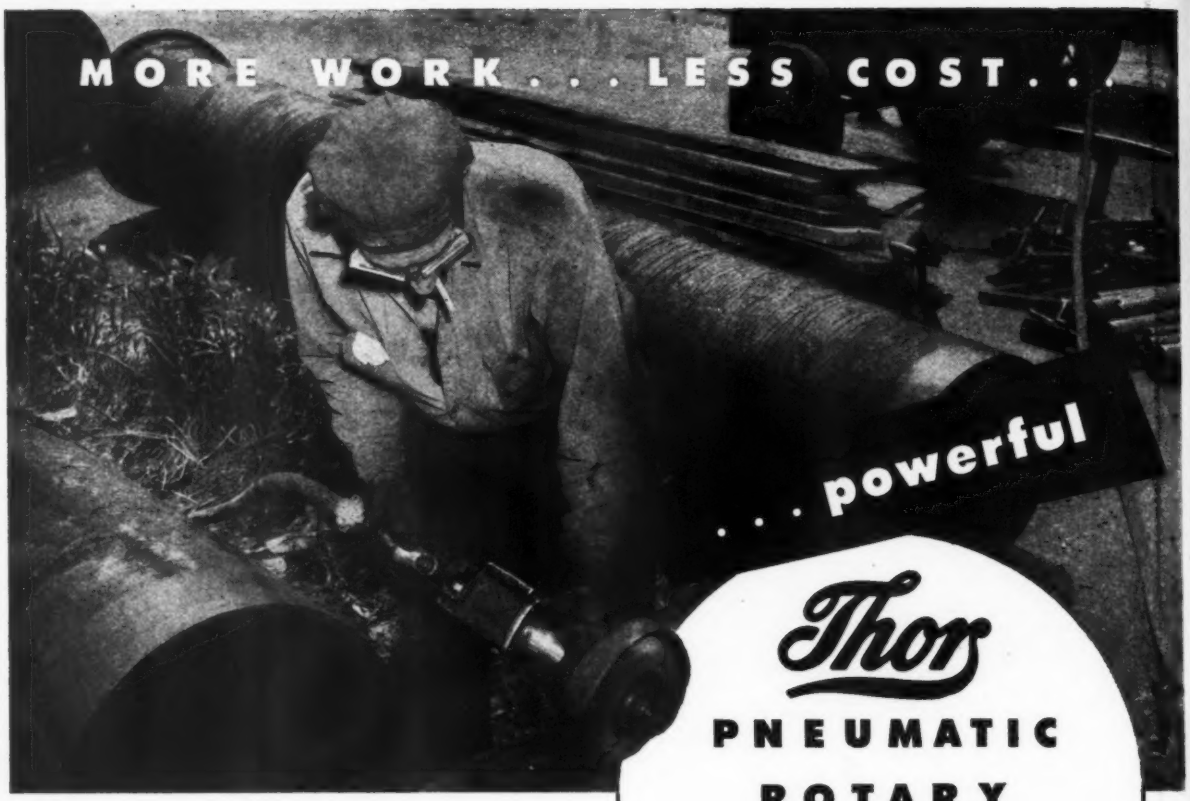
Plan now . . . but wait for **AMERICAN!**

AMERICAN MATERIALS HANDLING *for* EVERY INDUSTRY

AMERICAN HOIST & DERRICK CO.
Saint Paul 1, Minnesota
CHICAGO SAN FRANCISCO NEW YORK



Wherever wire rope is fastened . . . . use genuine **CROSBY CLIPS** *with the Red-U-Bolt*



Thor

PNEUMATIC ROTARY GRINDERS

Save Time on Grinding Jobs

The advanced construction features of Thor Air Grinders are developments utilized by Thor to assure you of top speed—peak efficiency—maximum power—light weight and extra stamina for the toughest jobs:

1. THOR "Air Behind the Blades" principle keeps the rotor blades out against the cylinder bushing wall, preventing dead center position and assuring instant starting under all operating conditions.

2. The solid one piece construction of the THOR rotor permits the use of deeper blade slots and wider blades. This greatly boosts the power and the rate of material removal.

3. The THOR Double-Acting Safety Governor acts to save time in two ways: It regulates spindle speed to the level of highest grinding efficiency for the size and type of wheel used. It prevents racing of wheels at dangerously high speeds even in event of mechanical failure of governor parts.

You will find these top speed construction features, plus others like THOR End Exhaust, Automatic Lubrication, and Labyrinth Seal on Spindle, in a complete line of THOR Air Grinders for every industrial application. For details, write for THOR Pneumatic Catalog No. 52B.

Thor PORTABLE Electric & Pneumatic TOOLS

Branches in Principal Cities

50 THOR AIR GRINDERS FOR EVERY TYPE OF JOB!


Thor Small Wheel Grinders


Thor Radial Wheel Grinders


Thor Surface Grinders

LOOK AT THE RANGE!

Number of Models	30
Wheel Capacities	1½" to 8" dia.
Speeds	3000 to 21,000 RPM
Lengths	5½" to 39"
Weights	18 oz. to 24 lbs.

INDEPENDENT PNEUMATIC TOOL CO.
600 W. Jackson Blvd., Chicago 6, Ill.
New York Los Angeles





Used on track bolts by more and more railroads because of high reactive spring pressure and adequate, uniform tension.

Verona
Fixed Tension
Triflex Springs





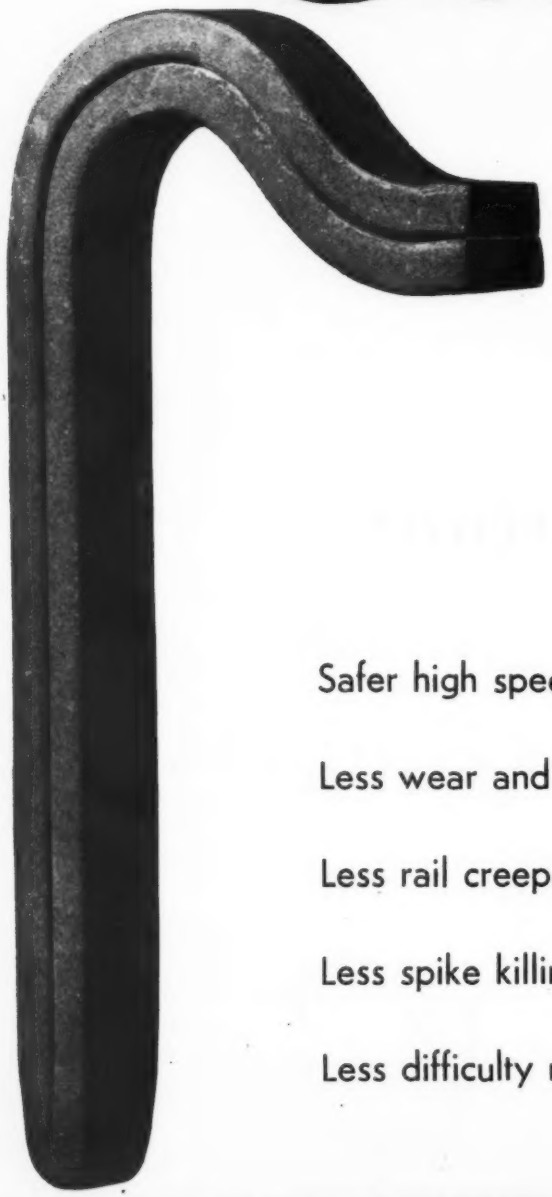


WOODINGS-VERONA
TOOL WORKS VERONA, PA.

SINCE 1873

SINCE 1873

Elastic
RAIL SPIKES





Safer high speed track

Less wear and tear on ties

Less rail creepage—both directions

Less spike killing

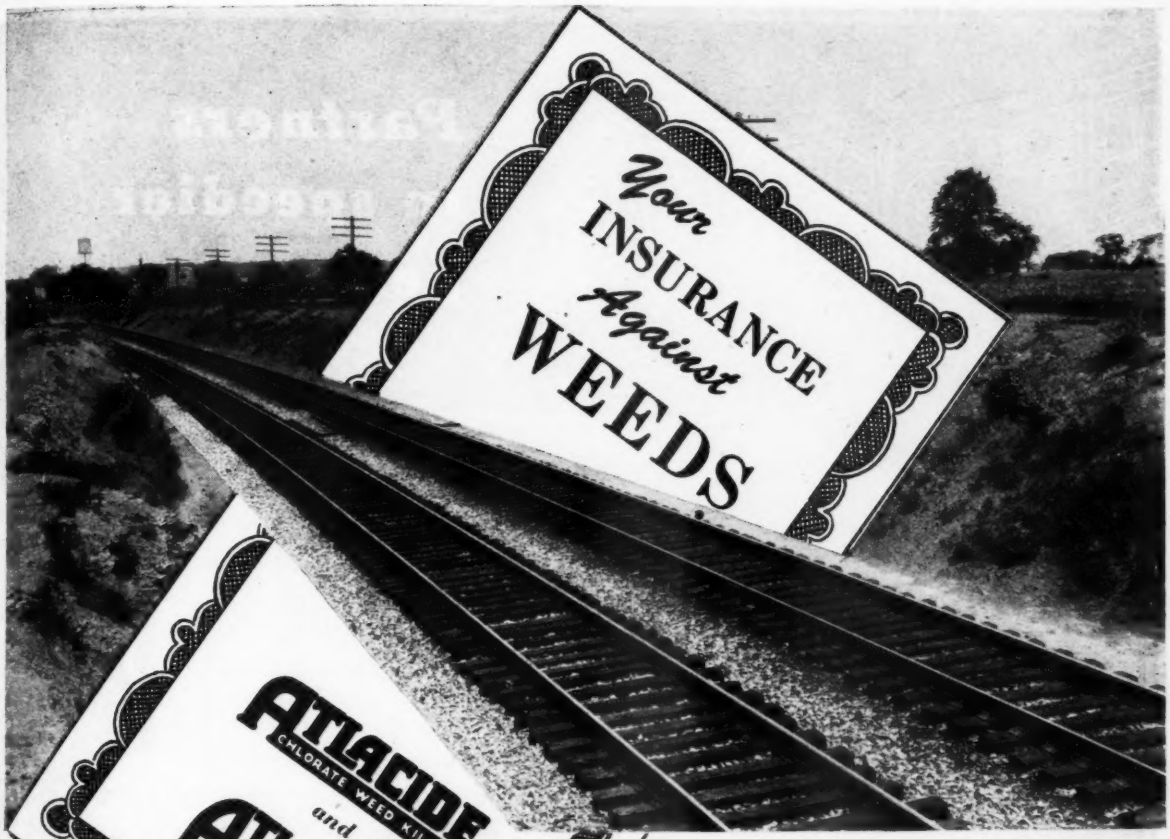
Less difficulty maintaining gage

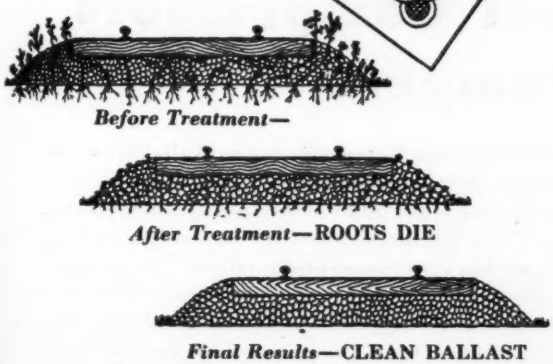
ELASTIC RAIL SPIKE CORPORATION

Affiliate of Bernuth, Lembcke Co., Inc.

420 LEXINGTON AVENUE NEW YORK, N. Y.

Houston » Pittsburgh » London





WEED-FREE TRACK is essential to every railroad. Here's why:

- Prevents fouling of ballast.
- Improves drainage.
- Retards decay of ties.
- Eliminates locomotive slipping.
- Reduces fire hazard.
- Simplifies track inspection and tie replacement.
- Improves appearance.

Applications of ATLACIDE and ATLAS "A" progressively reduce weed growth until clean track is obtained. At the same time the "annual premium" for protection against weeds is correspondingly reduced. The point is soon reached where all future treatments are confined to checking new growth at a minimum cost.

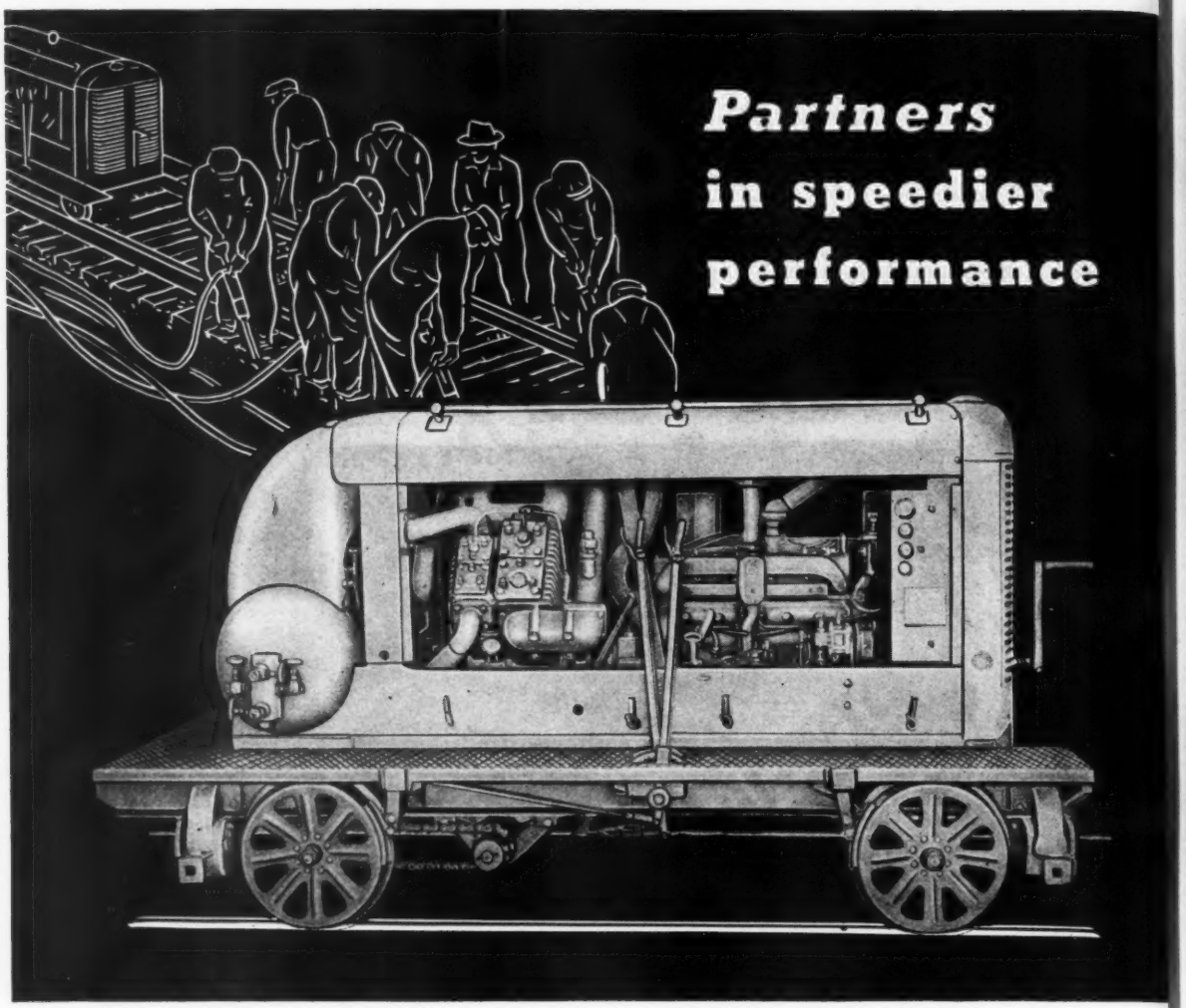
Atlacide and Atlas "A" then "pay dividends" in lower maintenance cost and better maintained track.

Now is the time to make plans for weed control next season. We invite your inquiry for thorough discussion of your particular weed problems and offer our service in their solution.

Over Twenty-five Years of Weed Control Service

CHIPMAN CHEMICAL COMPANY, Inc.

Chicago, Ill. · BOUND BROOK, NEW JERSEY · Portland, Ore.
Houston, Texas · Palo Alto, Calif. · No. Kansas City, Mo. · Winnipeg, Man.



CP Flanged-Wheel Compressors
CP Tie Tampers

REDUCE maintenance time and costs with CP Compressors and CP Tie Tampers! CP Two-Stage, Air-Cooled, Flanged-Wheel and other railroad mounted portable Compressors feature gradual speed regulator, varying the speed *gradually* up and down exactly with air demand. This and other design refinements produce a full-load performance of from 15% to 35% more air per gallon of fuel consumed.

CP Portable Compressors are available in gasoline driven or Diesel driven models in sizes ranging from 60 to 500 c.f.m. actual capacity. CP Tie Tampers, noted for their easy handling and low air consumption, enable you to make the most of compressor capacities. They are efficient in nipping and on small rises – also on jobs where the track is raised several inches. Write today for further information.

★★★★★★★★★
PNEUMATIC TOOLS
ELECTRIC TOOLS
HYDRAULIC TOOLS
ROCK DRILLS

CHICAGO PNEUMATIC
TOOL COMPANY
General Offices: 8 East 44th Street, New York 17, N. Y.

★★★★★★★★★
AIR COMPRESSORS
VACUUM PUMPS
DIESEL ENGINES
AVIATION ACCESSORIES

Flame Cleaning

QUICKLY AND ECONOMICALLY PREPARES BRIDGES FOR REPAINTING

Flame cleaning of exposed steel surfaces in preparation for maintenance painting has helped many railroads overcome the wartime labor shortage—and, at the same time, pointed the way to lower costs and longer paint life on bridges, signal towers, tanks and steel cars.

Quickly and easily applied by means of torches and special tips developed by Airco, the oxy-acetylene flame burns off most, if not all, of the old paint and loosens the scale and rust. The surface, after wire brushing, is free of all loose material. The flame also dries the surface moisture providing ideal conditions for repainting.

For complete information on the process—and suggested specifications covering all types of work, mail the coupon for copy of folder ADG 1066A.

REM

Air Reduction
60 East 42nd St.
New York 17, N.Y.

Gentlemen:
Please send me a copy of Flame Cleaning Folder ADG 1066A.

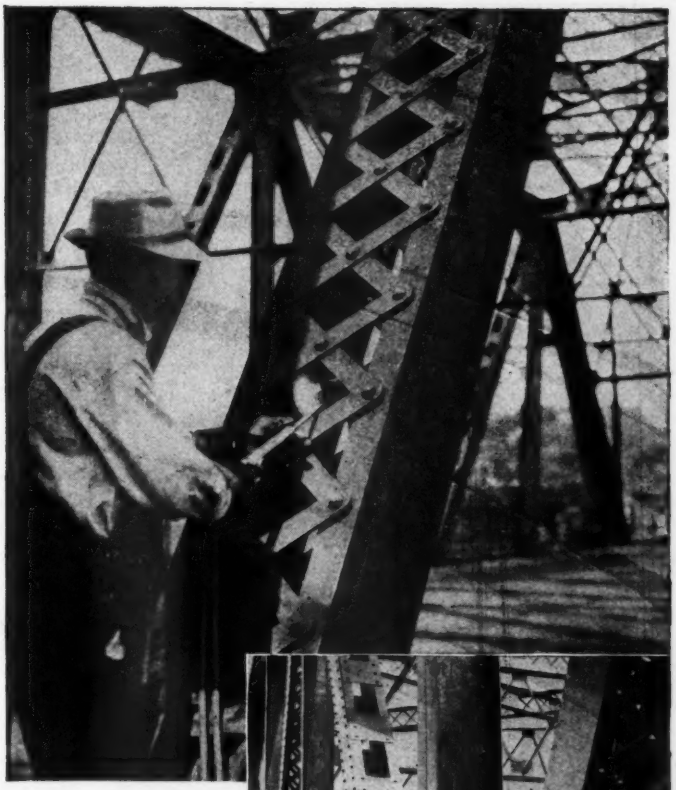
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*Title*_____

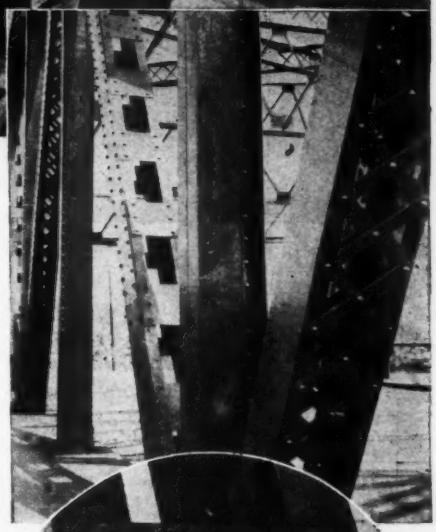
*Firm*_____

*Address*_____

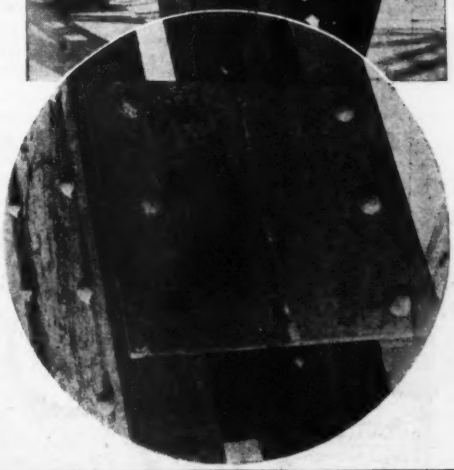
*City*_____ *State*_____



Flame Cleaning laced-web member. Flame easily reaches hard-to-get-at places.



After flame cleaning, the structure is now ready for application of the paint coat.

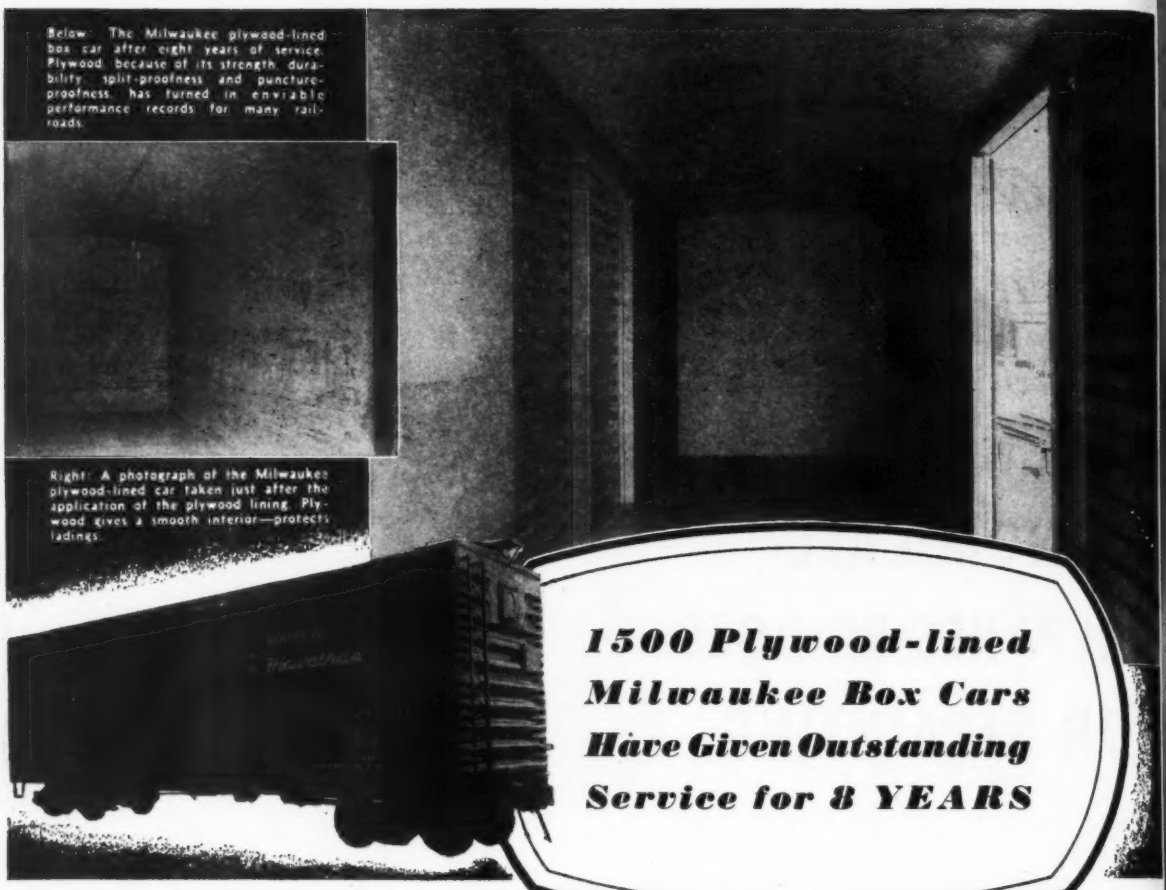


Before and after. Left side of plate shows conditions encountered. Right side shows section after flame cleaning and wire brushing.

AIRCO

AIR REDUCTION

General Offices: 60 EAST 42nd STREET, NEW YORK 17, N. Y.
In Texas: MAGNOLIA AIRCO GAS PRODUCTS CO. • General Offices: HOUSTON 1, TEXAS
Offices in all Principal Cities



Below: The Milwaukee plywood-lined box car after eight years of service. Plywood because of its strength, durability, split-proofness and puncture-proofness, has turned in enviable performance records for many railroads.

Right: A photograph of the Milwaukee plywood-lined car taken just after the application of the plywood lining. Plywood gives a smooth interior—protects ladings.

1500 Plywood-lined Milwaukee Box Cars Have Given Outstanding Service for 8 YEARS

"Plywood, adopted as standard lining under steel roofs where moisture is likely to form, has eliminated many claims due to moisture damage of lading," reports Chicago, Milwaukee, St. Paul & Pacific.

The Milwaukee Road, seeking a car that was both rugged and light in weight, made its first test-application of Douglas fir plywood for lining in July, 1934. The application was so successful that an additional 1500 plywood lined cars were built in 1936.

The photos above graphically show how well these cars have withstood eight years of service!

Plywood lining has many advantages. It prevents damage to ladings. It may be attached directly to the wood fillers, eliminating metal - to - metal contact and preventing frost penetration through bolts or screws. It is strong, rigid, split-proof and puncture-proof, can be handled easily in large panels during installation and gives a smooth, durable car interior. Flooring, sides or ends can be removed without affecting each other. In the 1500 Milwaukee Road cars, ¾" 5-ply plywood was used for sides and ends, while ⅜" 3-ply plywood was employed for ceilings. All sections were fastened with wood screws to fir strips bolted to the car body. Plywood cleats, ¾"x4", or metal spline, were used on joints not backed with fir strips. Panels were sealed and the backs were given one coat of red mineral paint.

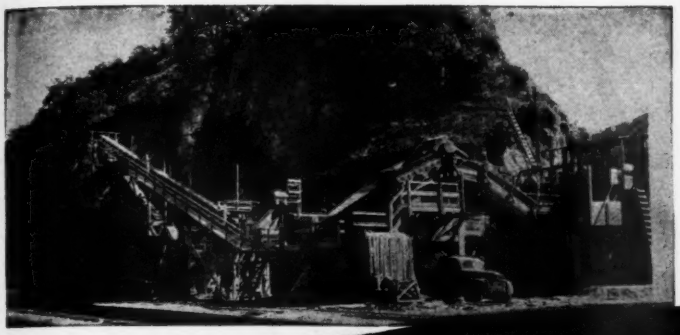
Remember—there is a type and grade of Douglas fir plywood for every railroad use. Douglas Fir Plywood Association engineers will be glad to cooperate with you in making full use of this material's many advantages.



SPECIFY DOUGLAS FIR PLYWOOD BY THESE "GRADE TRADE-MARKS"

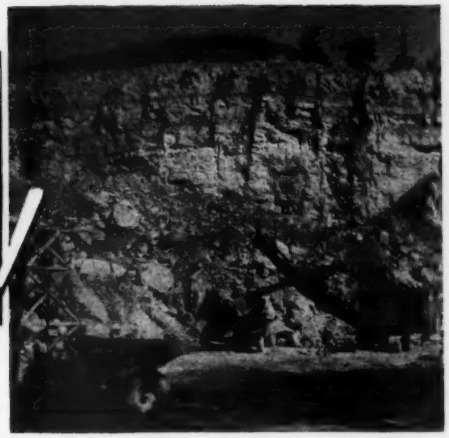
DOUGLAS FIR PLYWOOD ASSOCIATION
Tacoma 2, Washington

Today, of course, Douglas fir plywood is available only on highest priorities. Application for allocation must be made by suppliers to the War Production Board.

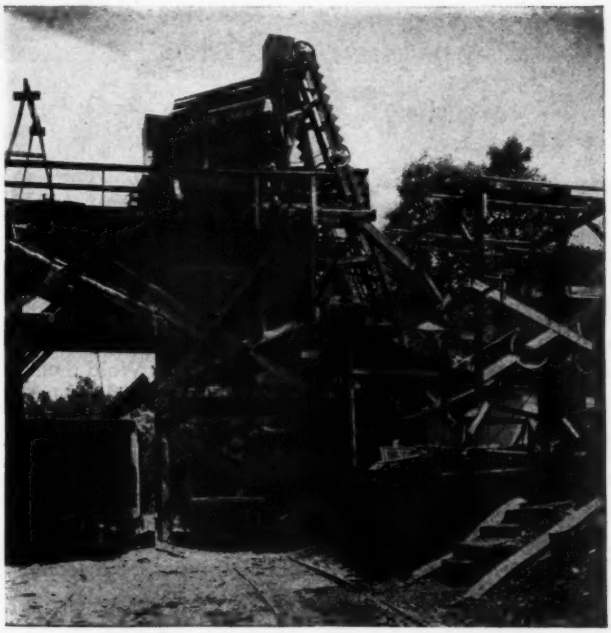


Universal rock crushing, screening and loading plant of E. C. Schroeder Co., Inc., Wyalusing, Wisc., producing ballast along the C. B. & Q. right-of-way. Equipment used and output is fully described editorially in this issue. View of the quarry, owned by the C. B. & Q., is shown below.

Here's the equipment for ballast production!



Universal plant of Coogan Gravel Co., producing ballast for Rock Island Lines is shown below—one of many Universal plants producing railroad ballast.



Since 1906, Universal has designed and built many high production rock crushing, sizing, washing and loading plants for the making of railroad ballast. These plants consist of standard matched units — overhead eccentric jaw crushers for primary and secondary reduction, gyrating and rotary screens, bucket elevators and conveyors, gyrating plate and apron feeders and other equipment — brought together to make a plant *tailored* to the particular requirements of the railroad or ballast producing contractor. Universal engineers have assisted in laying out a number of highly productive, low cost installations.

A number of railroads with quarries adjacent to their right-of-way have financed the purchase of Universal equipment or have purchased and leased plants to private operators. Send for complete information on Universal ballast plants.

UNIVERSAL ENGINEERING CORP.
649 C Ave. West, Cedar Rapids, Iowa

ARMY E NAVY

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CRUSHERS, PULVERIZERS, COMPLETE PLANTS, SPREADEROLLERS, PORTABLE ASPHALT PLANTS

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by P&H

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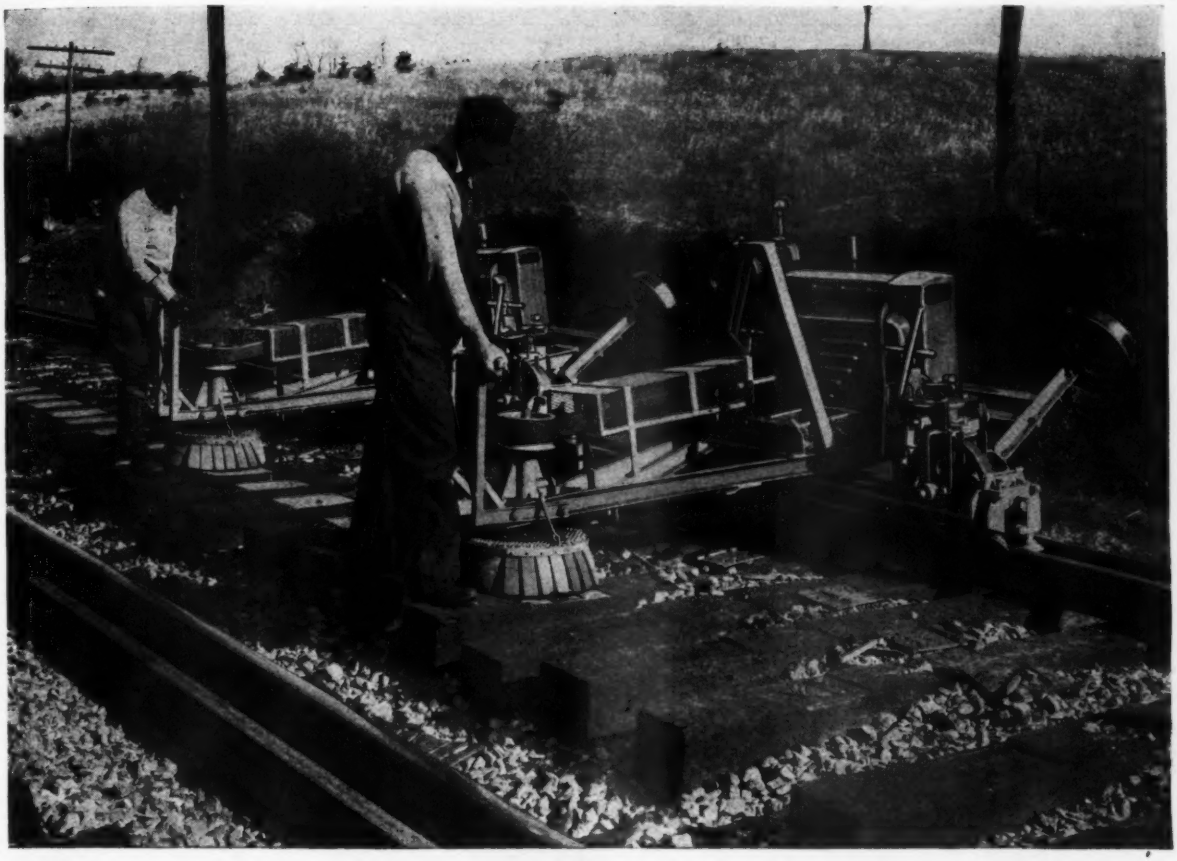

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Nordberg Tools For Your Maintenance Jobs

Adzing Machine
Spike Puller
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The adoption of Nordberg Adzing Machines as standard equipment by Class 1 roads for all rail laying jobs substantiates the claim that these machines provide the best possible foundation for rail. Many roads which have long required machine adzing of ties, are now securing an even better quality of adzing by replacing their early machines with the latest improved model. With the simple adjustments provided, the cutter head can be quickly adjusted for level or canted rail. In addition to saving time and speeding up the job, the ease of adjustment also results in an improvement in adzing.

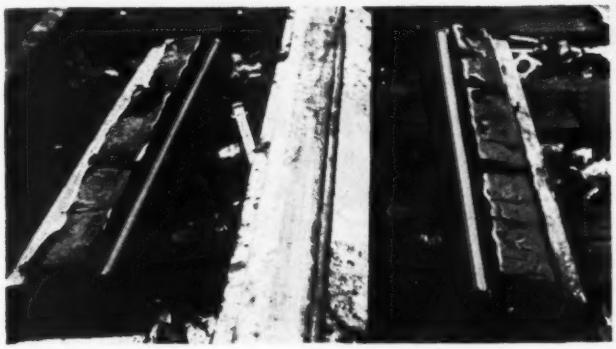
If you still have in service Nordberg Adzing Machines of the earlier model that after years of operation may now require considerable maintenance, it will pay you to investigate the advantages of the more improved machine.

NORDBERG MACHINERY

NORDBERG MFG. CO. MILWAUKEE WISCONSIN

Export Representative—WONHAM Inc.—44 Whitehall St., New York





. . . and unnecessary wear to the rail joint area by applying

RMC PACKING

Just one application will last for the life of the rail joint.

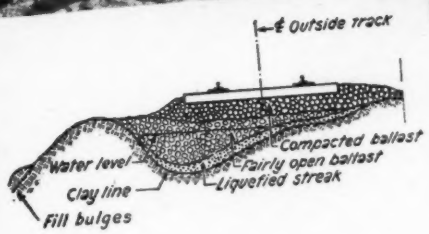
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Complete metal protection with Flintkote Protective Coatings offers triple economy. Material cost is comparatively low. Application is fast and simple. Long years of effective protection cut recurrent maintenance costs.

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He puts new "backbones" in tottering trestles



This maintenance superintendent on a main-line railroad rebuilds with ARMCO MULTI PLATE whenever a budget-eating trestle or bridge becomes unsafe.

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Learn how quickly you can repair or replace troublesome drainage structures with ARMCO MULTI PLATE. You'll be ahead on your postwar operations if you plan now on using MULTI PLATE in your modernization program. You can get all the facts from the Armco Railroad Sales Co. Incorporated, 491 Curtis Street, Middletown, Ohio.

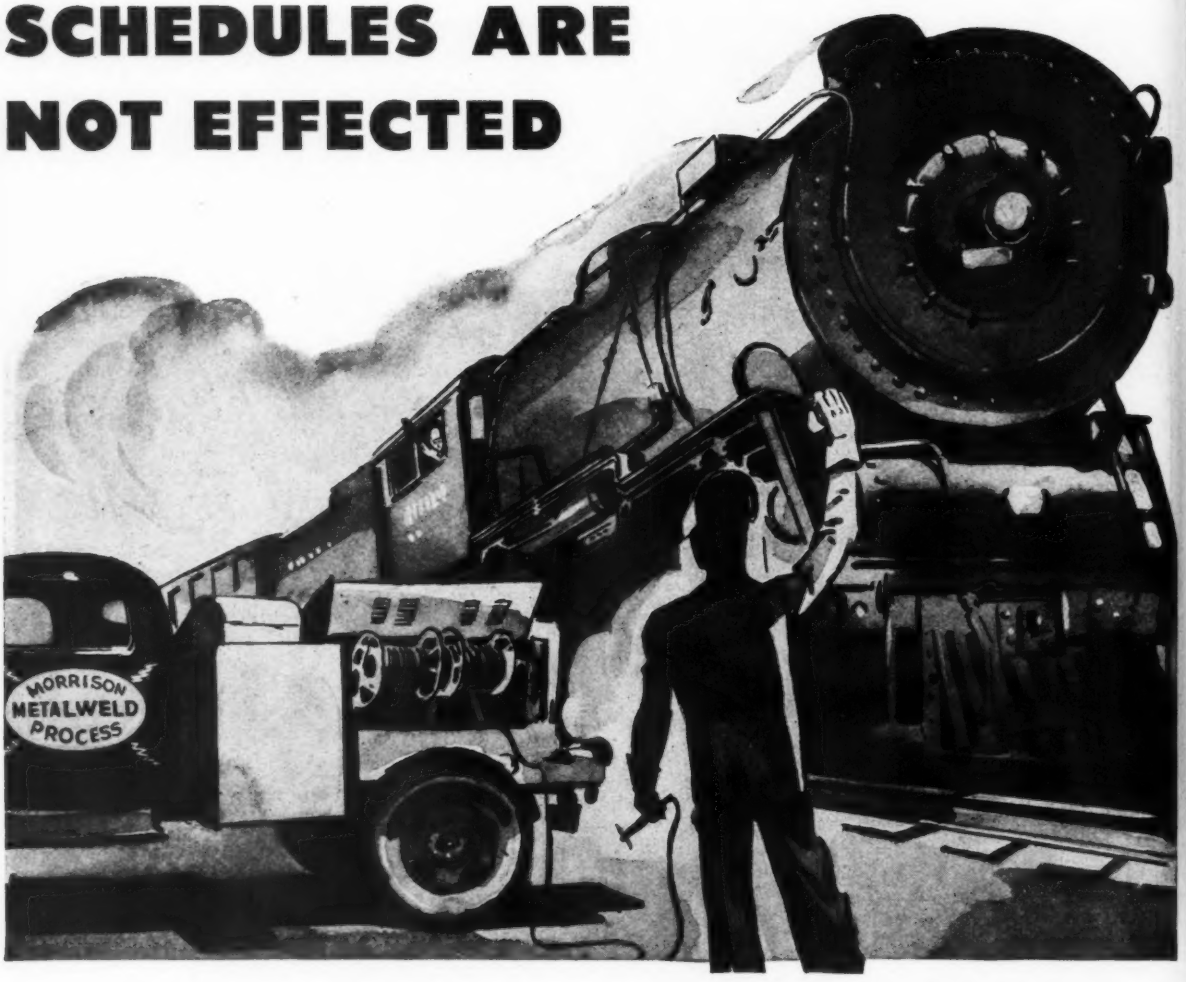
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MULTI ARMCO PLATE

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A PRODUCT ORIGINATED AND DEVELOPED BY ARMCO ENGINEERS

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● Even under wartime manpower difficulties, Morrison, through its licensee arrangement assures the same experienced and trained men; the efficient portable equipment available any where on short notice; plus the proven patented method of repairs to keep your frogs and crossings in service either on a unit or division contract arrangement. The thousands of frogs which we maintain under contract to many main line railroads offer concrete proof of this statement. Write us, and let us explain our methods of operation.

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SPEED AND POWER in Close Quarters



GET A POWERFUL LIFT with a LINK-BELT SPEEDER

MAKE THE LINK-BELT SPEEDER CARGOCRANE a "Natural" FOR SHOPS AND STORES

● Completely new in handling equipment, the Link-Belt Speeder Cargocrane will put all types of handling operations on a new, economical basis. Speed and maneuverability in close quarters are provided for by an abundance of power, and full-hydraulic controls.

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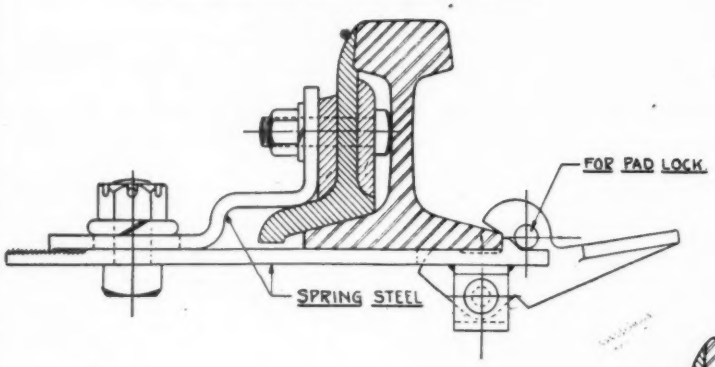
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SHOVELS-CRANES-DRAGLINES

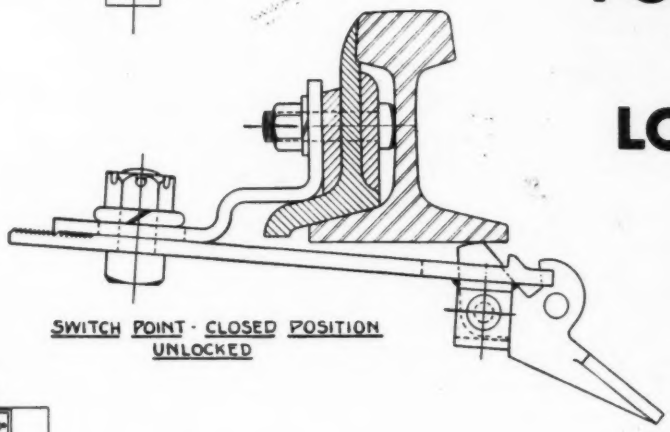


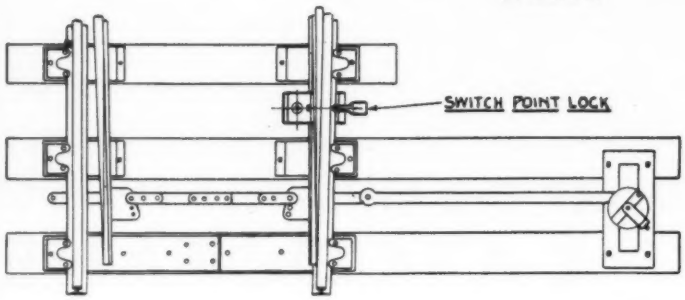
LINK-BELT SPEEDER CORPORATION, 301 W. PERSHING ROAD, CHICAGO-9, ILL.
(A DIVISION OF LINK-BELT COMPANY)

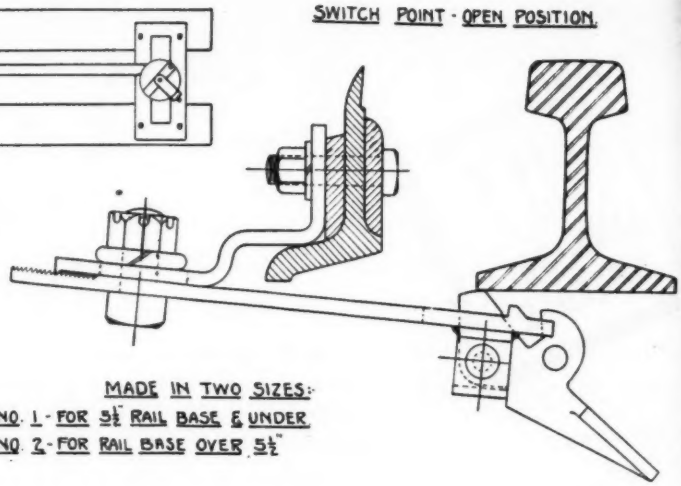
AUTOMATIC SWITCH POINT LOCK

SAFETY WITH ECONOMY









The switch point lock is a safety device, of rugged construction, simple in design, and a self-contained unit. It is automatic in its closing and locking action.

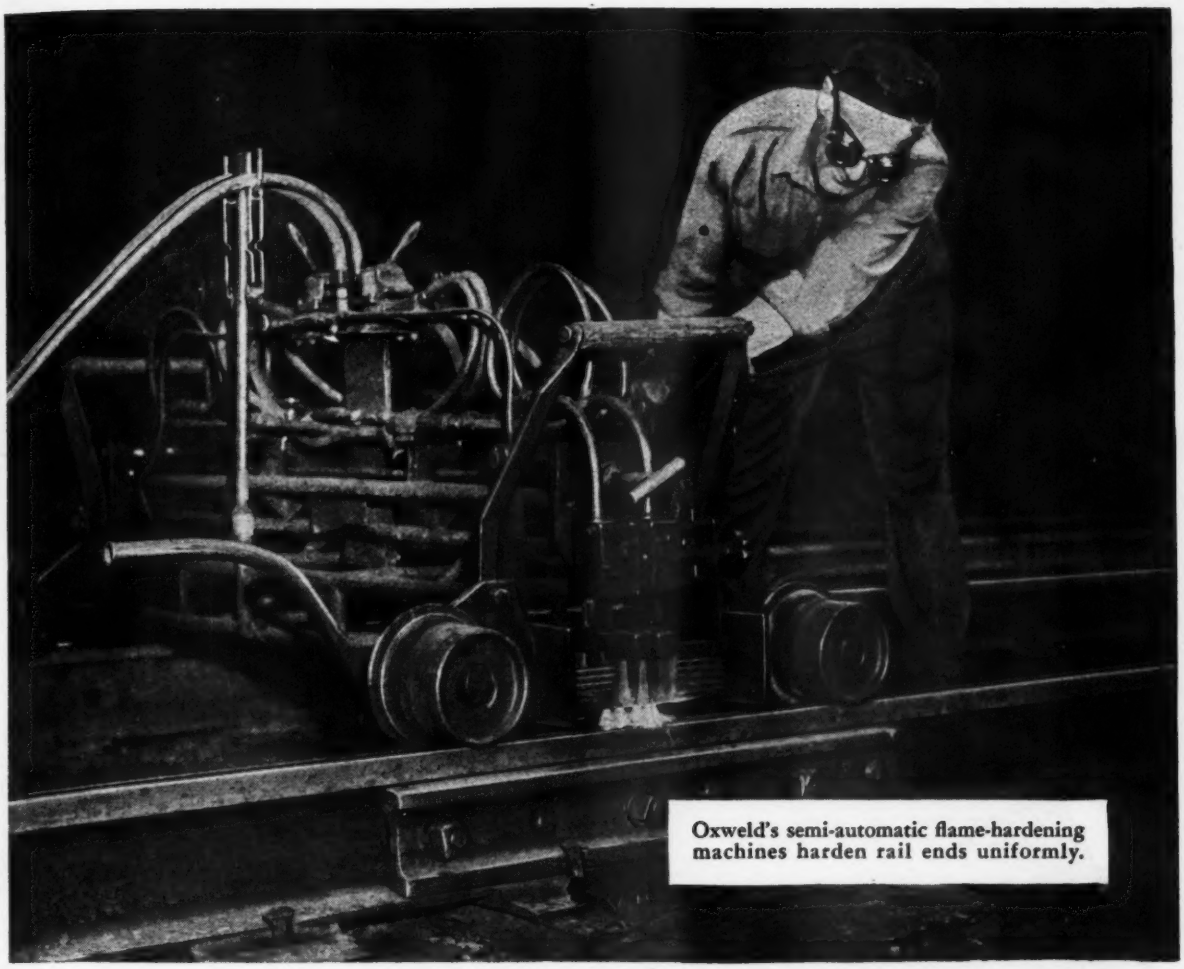
To operate the switch point lock, put foot on lever and push down, then operate switch stand lever in usual manner to throw or open switch. To close switch, operate switch stand lever in the usual manner and the device automatically returns to its normal or locked position.

MADE IN TWO SIZES:
NO. 1 - FOR 5½" RAIL BASE & UNDER
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THE RAILS COMPANY

General Office
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Oxweld's semi-automatic flame-hardening machines harden rail ends uniformly.

LENGTHEN RAIL LIFE...

With Oxy-Acetylene End-Hardening

● Oxweld's end-hardening of new rail by means of the oxy-acetylene flame greatly prolongs rail life because it imparts a uniformly hard, batter-resistant surface to rail ends. A rail-end flame-hardened by Oxweld's method will wear at about the same rate as the rest of the rail, eliminating the possibility of secondary batter. Smooth rail ends cause less wear on rolling stock. Maintenance of rail ends, joint bars, and bolts is reduced.

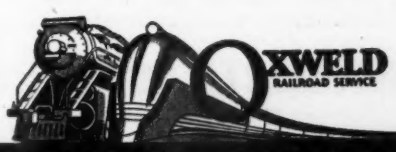


End-hardening is done in track and may be economically performed as a part of the rail relaying operation, thus taking advantage of the unoccupied track and getting maximum productive time with a small crew.

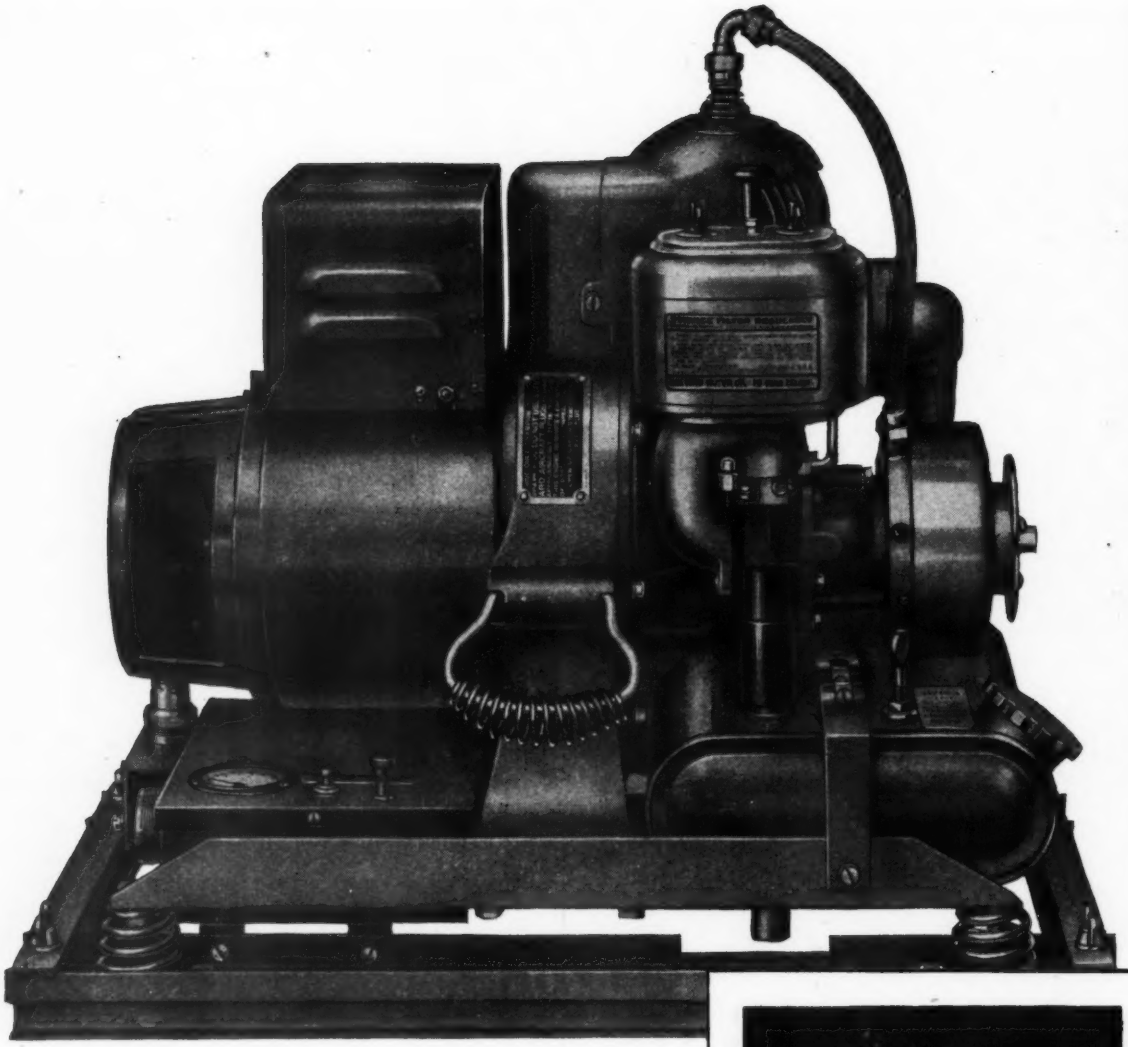
THE OXWELD RAILROAD SERVICE COMPANY
Unit of Union Carbide and Carbon Corporation

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Carbide and Carbon Building Chicago and New York



SINCE 1912—THE COMPLETE OXY-ACETYLENE SERVICE FOR AMERICAN RAILROADS



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No and's, if's or but's about it, a Homelite Portable Generator, installed in a plane or a tank is in no position to receive nurse-maid attention. It's usually crammed into some hot, tight corner where it is practically impossible to service it.

Which means just one thing . . . a Homelite Generator with its built-in gasoline engine has to work and stand up under the toughest kind of usage . . . hours on end . . . without receiving any attention or service. To meet demands like this . . . born of war . . . Homelite engineers have developed a higher powered, lighter-weight and, above all, a more dependable gasoline-engine-driven generator . . . a compact, portable Homelite that will meet and pass the performance requirements of any peace-time job.



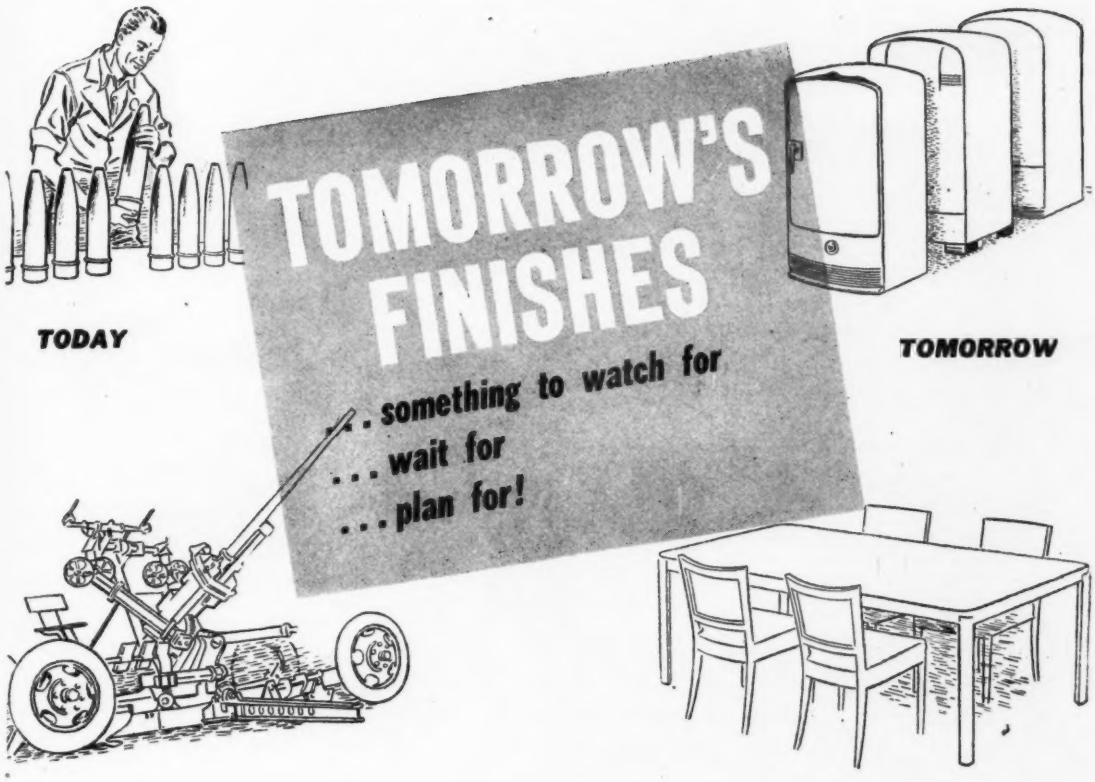
HOMELITE CORPORATION
PORT CHESTER, NEW YORK



FOR YOUR PEACE-TIME JOBS

The new Homelite Portable Generators that you will use after the war for operating brilliant floodlights or electric tools will work better in winter and summer. They will be more dependable even under the toughest operating conditions. They will work longer hours without attention or service . . . and will be more rugged and powerful than ever before.

Portable Pumps - Generators - Blowers



YOU'RE TURNING OUT THE TOOLS OF WAR. Or you're planning the products of peace. Whatever your finishing problem is, be sure you see Du Pont. *For Du Pont sets the pace in paints.* Du Pont gave industry DUCO and DULUX—now famous for automobiles, refrigerators, furniture, and a host of other products.

Du Pont offers war plants the services of skilled finish engineers, and of our Research Laboratories. Du Pont experts are answering wartime problems in hundreds of industries. They can do the same for you. *Du Pont Research continues to set the pace.*

Tomorrow's Du Pont finishes will be better than ever. New materials and methods due to war have given us new knowledge for formulating and applying finishes. If your peacetime products are in the planning stage, call us in now. Our experienced "know-how" will help you plan the new finishing systems that will keep step with your products-to-be. E. I. du Pont de Nemours & Co. (Inc.), Finishes Division, Wilmington 98, Del.

DU PONT
FINISHES DIVISION
Pacemaker in Paints

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

DU PONT

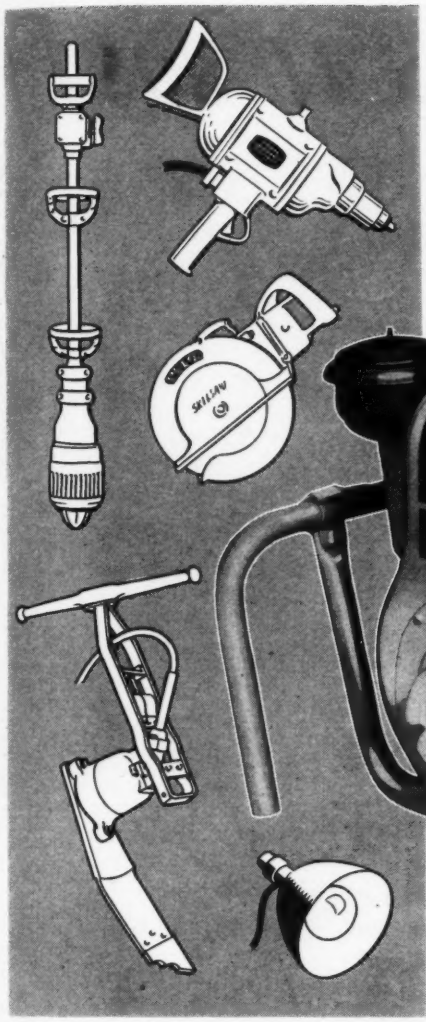


HOW TO END JOINT MAINTENANCE

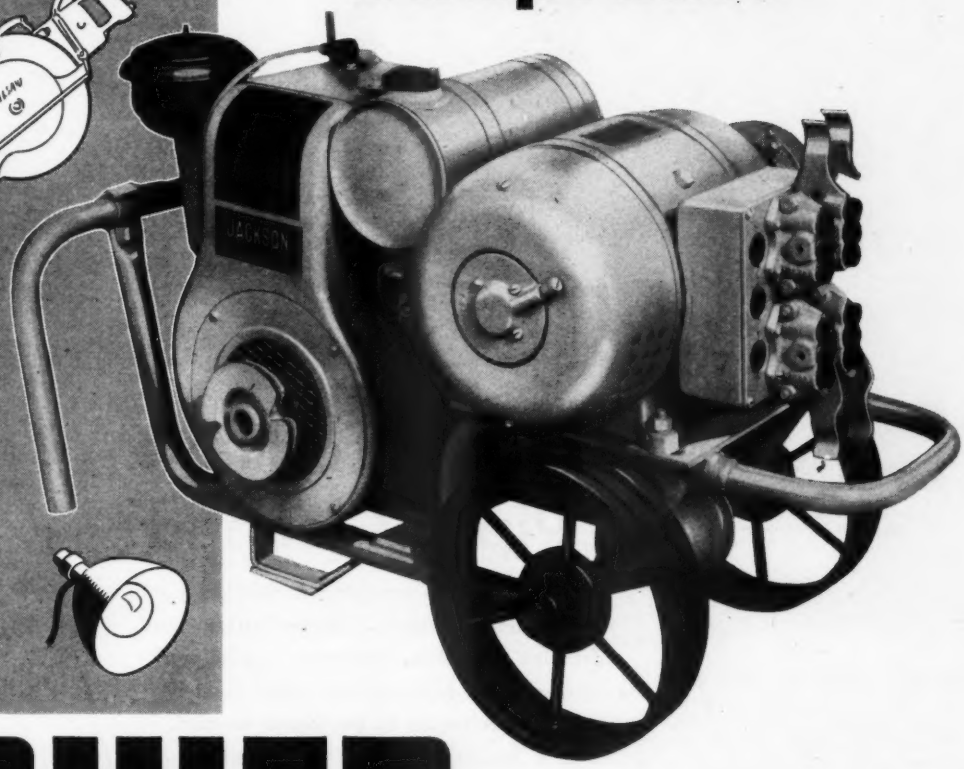
Thermit welding ends all rail joint maintenance problems by converting jointed track into continuous rail. This modern time-tested welding method is used for long stretches of open track, and for platform track, grade crossings and other short lengths where track maintenance is difficult. In tunnels, where severe corrosive conditions cause excessive joint maintenance, Thermit welding of rail joints has proven to be of special value.

The Thermit welding process requires only simple equipment. A short training period under a Metal and Thermit supervisor fits your own crew to do the work. The Thermit reaction produces rail-quality weld metal that forms a strong, permanent joint, with a minimum of internal stresses. Write for full details to Metal & Thermit Corporation, 120 Broadway, New York 5, N. Y., Albany, Chicago, Pittsburgh, So. San Francisco, Toronto, Ont.

Thermit Welding



dependable portable adaptable



POWER

Dependable — 25 years of outstanding performance for Railroad Maintenance and B & B Engineers proves the rugged practicality of the JACKSON portable power plants; ***portable*** — semi-permanent or permanent maintenance service in shops or tool cars, flood lighting service on night or emergency jobs (on wheels or skids) demonstrates the indispensability of the JACKSON portable power plants; ***adaptable*** — in supplying power for the operation of light or heavy duty motors, vibrators, tampers, drills, saws, grinders and other electric B & B tools, the amazing serviceability of the JACKSON portable power plant is unequalled. Its wide range of POWER service, trouble-free performance, minimum operating cost and upkeep make it a profitable investment for B & B departments. POWER . . . take it where and when you want it! JACKSON portable power plants are manufactured in 5,000, 2,000 and 750 watt sizes, single phase and 3 phase A.C.



ELECTRIC TAMPER & EQUIPMENT CO., LUDINGTON, MICH.

HOW MUCH DOES IT COST



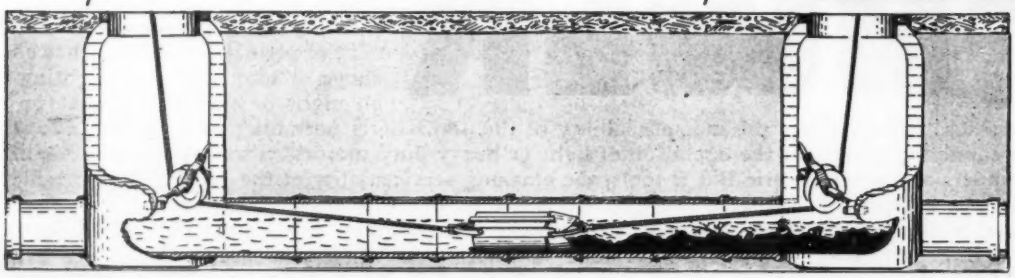
Above deposit removed from 16" sewer at enginehouse.

NOT To Have Pipes Cleaned?

Clogged sewers—resulting in flooded yards and buildings—make enginehouses and turntables unusable. Important repair work is consequently delayed and trains must be moved to other points to be turned around. TIME is lost—COSTS are increased. So, it pays in time and money to have pipes cleaned properly!

Pittsburgh's Experts can Clean Pipes Faster, Better and More Economically.

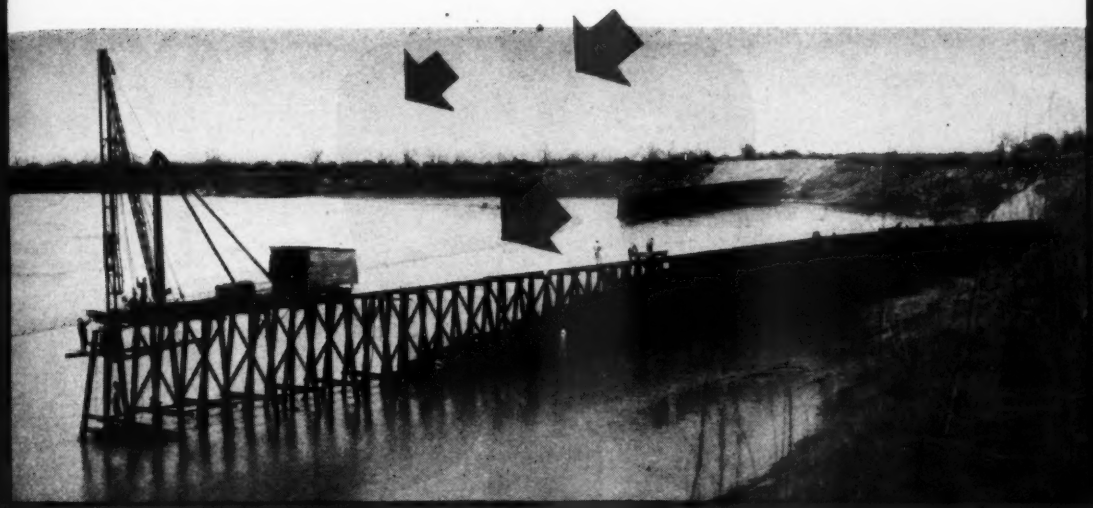
Write for information about our systematic Pipe Cleaning Service available on a contractual basis.



PITTSBURGH PIPE CLEANER COMPANY

433 Melwood Street Pittsburgh 13, Penna.

Pressure treated jetties



Made this "Bank Robber" put it back

When the Colorado River goes on a rampage, it's not unusual for the torrent to bite as much as 200 feet from the outside bank of a bend. The threat to adjacent railways and highways makes effective control measures essential. The most effective and successful protection, according to engineers' reports, has been provided by pressure-creosoted, permeable, pile trestle jetties. Not only is further erosion halted, but in many instances it is possible to make the river itself repair previous damage.

Two such jetties were recently constructed by the Commissioner's Court of Wharton County. The one illustrated has a total length of 1,250 feet, and contains 23,300 lineal feet of wood piles and 98,300 board feet of timbers and plank. All material is Southern Yellow Pine, treated with creosote to a net retention of 8-lbs. per cubic foot. These jetties were built by Austin Bridge Company of Houston.

The Missouri Pacific Lines have also made extensive use of this type of bank protection. One group comprises 11 individual creosoted jetties, built between 1929 and 1937, supplemented with steel angle retards cabled in place on the face of the bank. Not only has the bank been successfully stabilized, but a considerable amount of "reclamation" has been done by the river itself, as a very substantial deposit in the form of drift and sand bars has been created.

Pressure-treated wood jetties and groins not only give dependable protection . . . but generally cost considerably less than other types of permanent construction. The treatment gives long-lasting dependable protection against decay and (in salt water installations) against marine borers. We will be glad to give you full information.

KOPPERS COMPANY, INC.—WOOD PRESERVING DIVISION

PITTSBURGH 19, PA.

KOPPERS

Buy War Bonds— and Keep Them!

THE INDUSTRY THAT SERVES ALL INDUSTRY



T. R. RAIL



and IMPROVED HEADFREE JOINT

The TORSION RESISTING *Principle*

permits, by economical distribution of metal, a stronger and better rail, and a sturdier coordinated rail and joint structure, pound for pound, than any other design.

The following ADVANTAGES accrue:

Increase in torsional rigidity

Stresses, resulting from lateral and eccentric loads, materially reduced in upper rail web and fillet

A stronger assembly at the rail ends

Improved rail end condition with increased life at joint bars afforded by enlarged head-web connecting fillet.

THE RAIL JOINT CO., INC.

50 CHURCH ST., NEW YORK 7, N. Y.



2 Reasons why

RED LEAD

means Extra Rust Protection . . .

Why is Red Lead so widely accepted throughout industry as *The* metal protective paint?

Why are paints containing Red Lead so generally specified for safeguarding metal surfaces from the costly ravages of rust?

The reasons are many, but none are more noteworthy than Red Lead's ability to counteract acid conditions and to halt electrochemical action—both prime causes of rusting—as explained at right.

Still another important advantage of Red Lead is that it partially combines with the usual vehicles to form compounds generally known as "lead soaps." Due to their composition and the individual way in which these compounds form, the film obtained is highly water-resistant. In addition, lead soaps contribute to the formation of tough, elastic films that "stick on the job."

Remember, too, that Red Lead is compatible with practically all vehicles commonly used in metal protective paints, including phenolic and alkyd resin types.

Specify Red Lead for ALL Metal Paints

The value of Red Lead as a rust preventive is most fully realized in a metal paint where it is the only pigment used. However its rust-resistant properties are so pronounced that it also improves any multiple pigment paint. No matter what price you pay, you'll get a better metal paint if it contains Red Lead.

NEUTRALIZES ACID

1 Red Lead has the ability to counteract acid conditions which are recognized as accelerators of rust. Structural steel is exposed to such environments because acid forming compounds are carried by the atmosphere in the form of gas, smoke and moisture. Red Lead has a neutralizing effect on these conditions as it is essentially a *basic* pigment with the ability to develop and maintain, for a prolonged time, a mild alkaline environment at the surface of the metal. Authoritative tests show that, as a result, Red Lead inhibits the process of corrosion. In short, metal paints, too, should "stay on the alkaline side."



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* * *

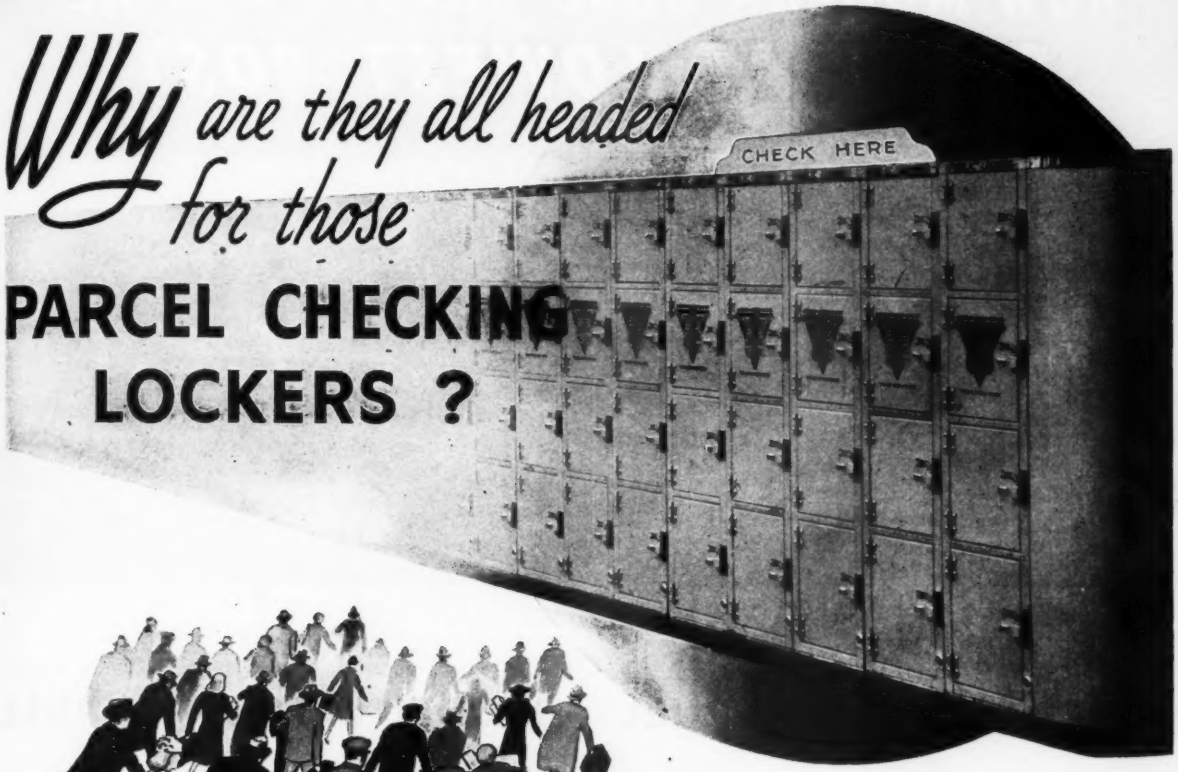
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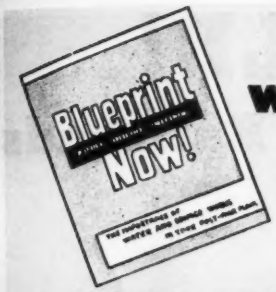
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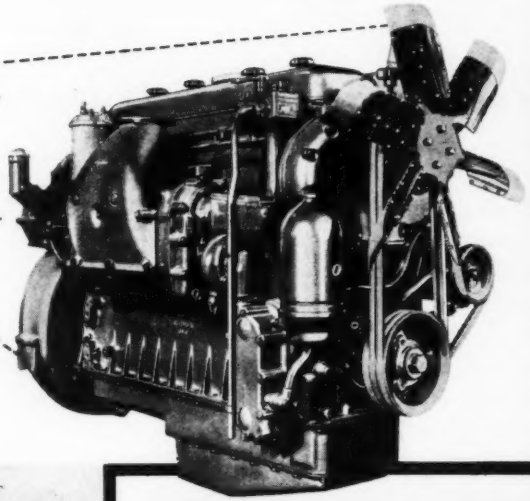
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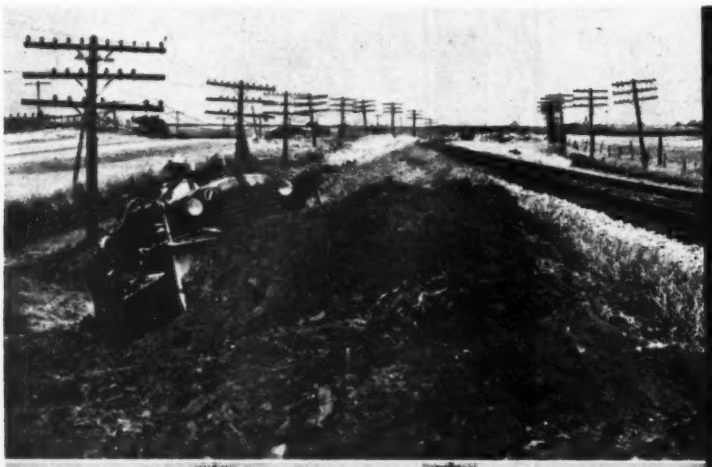
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No. 194 of a Series

Railway Engineering and Maintenance

SIMMONS-BOARDMAN PUBLISHING CORPORATION

105 WEST ADAMS ST.
CHICAGO 3, ILL.

Subject: Reprints

February 1, 1945

Dear Readers:

I call your attention to the following letter, one of a number of such letters received recently, with a special point in mind.

"The article which appeared on page 1135 of the December issue of Railway Engineering and Maintenance provides a very clear description of the tests conducted by the research staff of the Association of American Railroads, concerning damage to rail which may be caused by a spike maul hitting the web of the rail during cold weather.

"I would like to have this article distributed to each of our roadmasters, of which we have 46. No doubt, many of these men already subscribe to Railway Engineering and Maintenance, but I feel that the subject is one of such importance that it should be given special consideration.

"If the article has been reprinted in sufficient numbers to allow you to send me 50 copies, it would be very much appreciated, and if there should be any charge for the printing, kindly let me know and I will take care of it in the usual way".--signed, engineer maintenance of way.

I bring this letter to your attention, and could cite many others, to make clear to any of you who may not be informed, that, to extend our service to those of you who may at any time desire a considerable number of extra copies of any article appearing in a current issue of our publication, we are in a position to make these copies available, through special reprints, at actual production cost. Many of you know this, which is evidenced by the frequent requests which we receive for from 50 to 1,000 or more reprints of articles, but that there are others who are not aware of this arrangement, is evidenced by the many requests which we receive for additional copies of specific issues as a whole, usually because of special interest in a single article.

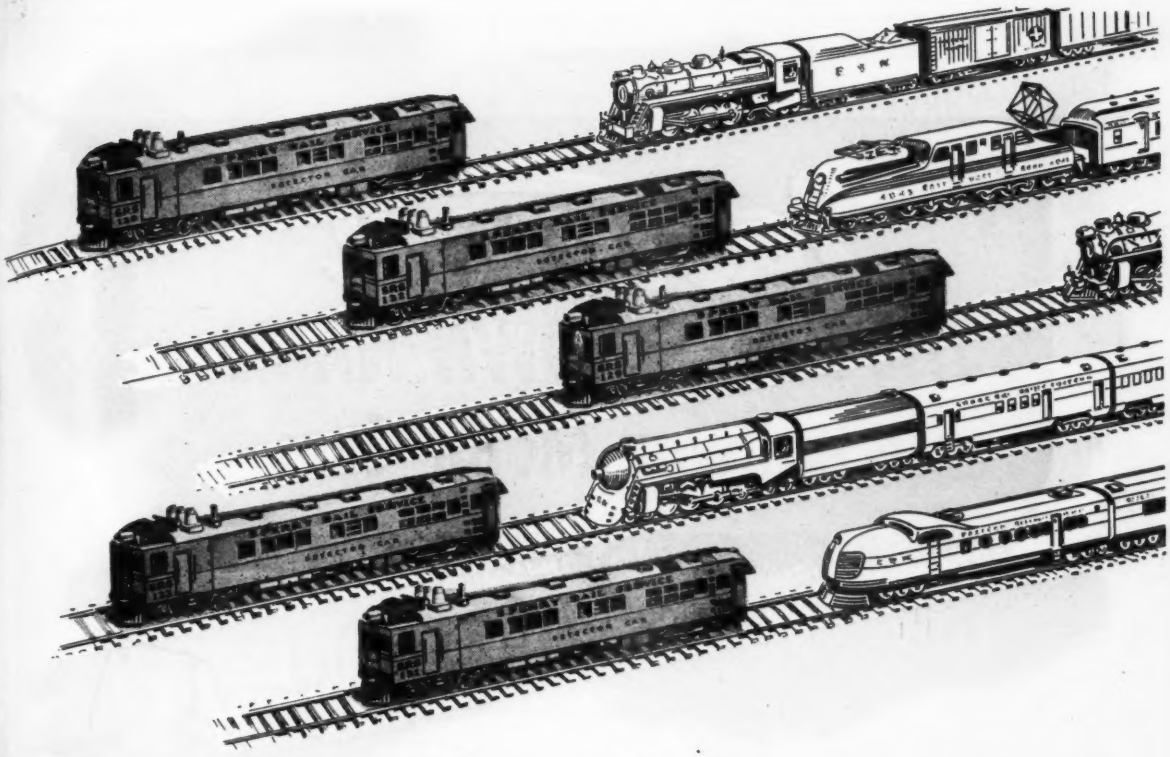
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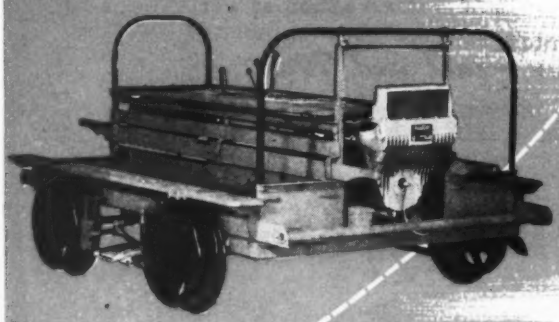
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Railway Engineering and Maintenance

NAME REGISTERED U. S. PATENT OFFICE

FEBRUARY, 1945

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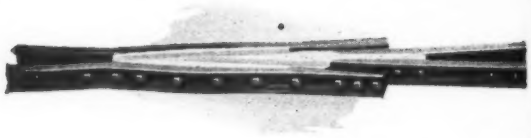
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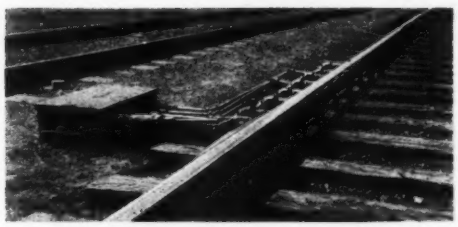
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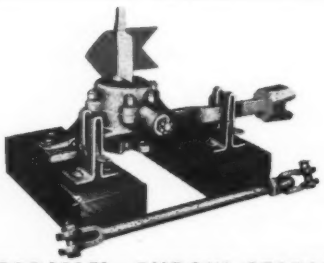
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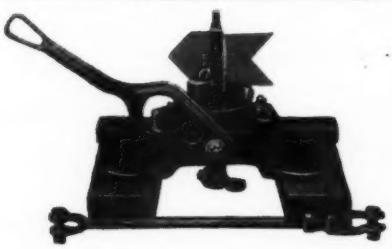
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Railway Engineering and Maintenance



The Future—

Bright or Dark—Depends

The war is not over. There is a big war job still ahead for every railroad—and for every railroad man. Well aware of this, every railway employee, from executive officer down, can be counted upon to apply his full energies to complete the job.

But as the soldier at the front may well question what he is fighting for, what will come of his efforts, and what he will return to when the fighting is over, one can not stop railway men from thinking about the future, and many of them are. In fact some who have, have left railway service, in part, at least, because they questioned that the future of the railways is bright. Others are still puzzled, concerned, uncertain. This is quite natural—for many of them, the future of the railways, bright or dark, is their future.

No one would contend that, following the war, the railways will continue to hold the present preponderance of the freight and passenger business of the country. They will have competition by airplane, by bus, by truck, and by the private automobile, the like of which they have never known. That they recognize this future competition is the first and most encouraging sign that there *is* a future for the railways, and for every loyal railway employee. Equally encouraging is the fact that they are planning to do something about it, and, both as individual roads and as an industry, are taking aggressive steps to find out what the public wants and how they can give the public what it wants. Public likes and dislikes are being ascertained by many and varied surveys conducted by individual roads and by the railway passenger car builders. Further research to this end is being carried out by special committees of the Association of American Railroads. Already much is known, and plans are being made for passenger train equipment, service and merchandising that will outdistance anything to date. Luxury, comfort, maximum safety and speed, with many other conveniences and auxiliary services thrown in—all reasonably priced—will be the answer of the railways to passenger competition, and the railways' answer to competition for freight traffic will be no less comprehensive and effective.

Railway managements were never more alert to the problems that will confront them following the war, and were never more aggressive in their outlook and planning. Their experience in providing record-breaking war-time freight and passenger service has done much to convince them that what was thought impossible only a few years ago, can be done—that the possibilities in railway transportation service in the future are practically unlimited.

In this new vision of the future, every maintenance of way employee should find encouragement—can take new heart—and should help dispel, wherever he finds it, any attitude of defeatism. Furthermore, he must have vision himself and accept his full responsibility, because he will have a definite part to play. He must look to his tracks, his bridges, his buildings, and to the maintenance of adequate car and locomotive servicing facilities. Much of the security, speed and comfort of train travel in the future will depend upon his ability to maintain a suitable track structure. The length of overall train schedules will depend to a large extent upon his ability to conduct essential work without interfering with traffic; and he certainly can not expect passengers to be attracted to the railways through dingy, outmoded and insanitary passenger station facilities.

No, the future of the railways is not dark. But how bright that future will be will depend, more than anything else, upon the loyalty, the ingenuity and the aggressiveness of railway men—in every department.

Organization—

Work Gangs Must Be Kept Up To Date

ON many roads certain track maintenance tasks, usually those involving out-of-face operations, are performed by gangs conforming to standard organization charts setting forth the number of men to be assigned to the particular gang, the tasks to be performed by each man and the types and amount of equipment to be used. Obviously, the soundness of this policy is beyond question. Assuming that each gang organization represented in the standards embodies the best practices yet developed covering the particular task, following these standards will produce many benefits in the form of increased efficiency and economy and in the superior quality and uniformity of the work performed.

It is well to keep in mind at all times, however, that, where gang organization is concerned, a given standard simply represents the summation of all experience gained in carrying out the particular task up to the time the standard was put into effect. To state it another way, in the well-ordered maintenance department any gang organization in use at a particular time is not regarded as the last word in perfection, but is always subject to adjustment or revision to incorporate improvements dictated by experience or new developments. There can be no argument with the proposition that to consider an established practice as something rigid and inviolable is to impede progress.

Any one of a number of different things can happen that may render a particular organization obsolete over night. A machine or tool may become available that can be applied to some operation that was formerly done by hand, or an existing machine already in use may be improved in such a manner as to enhance its efficiency, or an employee may come forward with an idea for improving the performance of the gang by a revision of its organization. Ordinary prudence dictates, of course, that such innovations must be thoroughly tested and proved before being put into practice, but the point that it is desired to emphasize here is that adequate machinery must be set up for the examination of new ideas and the adoption and placing into practice of those of demonstrated value.

It matters little how this machinery works so long as it is effective in achieving its purpose. On some roads the matter is considered annually at a meeting of the system, district and division maintenance officers, at which the various gang organizations in effect are scrutinized and revised as necessary to incorporate any new advances that may have come to light during the year. Where this is done, a gang organization, rather than becoming relatively fixed more or less indefinitely at a particular stage of development, is in a constant state of evolution in the direction of greater efficiency and effectiveness. Otherwise the possibility exists that the making of needed improvements will be delayed indefinitely.

Maintenance men cannot for a moment permit themselves to relax in their efforts to achieve a higher degree of efficiency in carrying out the work of their departments. In view of the highly competitive conditions that are likely to prevail in the transportation field in the postwar period, their obligation in this respect will be greater in the future than ever before. One way that they can help to discharge this obligation is to make certain that, in organization and equipment, their work gangs incorporate the most up-to-date practices—not merely those that were considered the best last year or the year before.

Rail—

Deferred Maintenance Increasing

ALTHOUGH more rail was made available to the railways in 1944 than in any year since restrictions were placed on its use in the interest of the war effort, the need for new rail is greater now than it was at the beginning of that year, for it is the general testimony that rail wear is still exceeding rail replacement. As the 1944 working season came to a close, the question arose, therefore, as to what shall be done in 1945 to maintain the rail that is slated for renewal, in the event that sufficient replacement rail is not available.

In many instances, rail that is slated for renewal this year should have been renewed two or three years ago, and would have been if sufficient new rail could have been obtained. As a result of this continued inability to make the needed replacements, coupled with the unusual volume of traffic which it is carrying, much of this rail is now afflicted with battered joints, worn fishing surfaces, line and surface kinks and, in some cases, with corrugations. In addition there are likely to be wheel burns.

Where any **or** all of these conditions prevail, it will be difficult, if not impossible, to maintain a satisfactory surface by spot surfacing alone, and the riding conditions are certain to be far from satisfactory. However, conditions can be improved considerably by giving the rail a light running surface for, almost invariably, when rail is in this condition, the track will be found to be center bound. After the track has been raised out of face, spot surfacing will be needed in considerable measure, however, to keep it in reasonably good condition.

Usually, when rail is overdue for renewal, the ballast is also in need of replacement. While it is not desirable to replace the ballast until after the new rail has been laid, careful consideration should be given to cleaning it, for it is quite likely to be dirty and may be churning. If it is known that the rail cannot be replaced for a considerable time, ordinary tie renewals should be made, but if the replacement will take place within a short time, only broken ties and those that have failed completely from other causes should be renewed until the track is surfaced after the rail is laid. In addition, every effort should be made to keep the track in line and to gage, and all ties should be tamped thoroughly. Then, when the new rail is laid, it will have adequate and satisfactory support and there will be little chance that it will be damaged through lack of uniform support.

Although, admittedly, it is still necessary to place some restrictions on the manufacture of rail, to assure that there shall be no lessening of the flow of arms, ammunition and equipment to the fighting fronts, within this limitation every effort should be made to obtain sufficient new rail to replace that which is overdue for renewal, and as much in addition as will be needed to replace that which will be due for renewal this year. The war is by no means over, and the railways must continue to perform an essen-

tial service in the transportation of military supplies, as well as of the raw materials for their manufacture. It would be management of the poorest and most culpable sort to allow any interruption of this service by reason of failure to provide the materials needed to keep the railways in condition to handle maximum traffic demands.

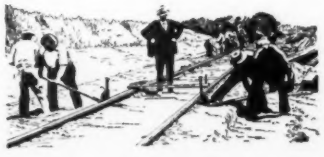
Weed Burners—

Use for Melting Snow Teaches Lesson

IT is a self-evident axiom in connection with the use of mechanized equipment that, to secure maximum efficiency in their use, individual machines must be kept in effective operation as much of the time as possible. Therefore, it should be the objective of every supervisory officer responsible for the operation of work equipment to develop a high usage factor for every machine under his jurisdiction. This can be done by careful attention to the matter of scheduling the use of these machines, and by employing each machine for as many different operations as can be developed for it. It is the last of these two considerations that we are concerned with in this discussion.

Some machines are of a multiple-purpose nature, and with these types the problem of finding something for them to do the year around is a relatively simple matter. Others are of a more specialized nature—in some cases being designed to perform a single operation only—and opportunities for adapting such machines to other tasks are not always readily apparent. However, that ingenuity and imagination, combined with a good measure of perseverance and stimulated by necessity, can sometimes produce rather unexpected results in bringing such applications to light, is shown by the successful adaptation of weed burners to the melting of snow on the Illinois Central, as described in a feature article in this issue. There are not many machines employed in railway maintenance work that are more highly specialized than the weed burner. Yet the experience of the Illinois Central, and other roads as well, strongly indicates that, as a snow melter, the weed burner is a "natural," being capable of doing the work of as many as 100 men with brooms and shovels, and of doing it better.

The requirements for making such adaptations successfully include, first, the need for mechanizing a particular task; second, the idea of how to adapt an existing machine to a new operation; and, third, the necessity of preventing indifferent results in the beginning from discouraging further effort. The latter is particularly important. On roads where weed burners are being used successfully in melting snow there are those who, while now highly enthusiastic regarding the results being obtained, were formerly just as certain that the machines could not be adapted successfully to a task so far removed from that for which they were designed.



It is not meant to imply that new applications can be found for all specialized machines, or even the majority of them. On the other hand, when opportunities for such adaptations are found and prove practicable, it is reasonable to expect that the resulting benefits, in the form of increased efficiency and economy, will be of a substantial nature. On this basis it would seem that maintenance men are justified in being on the alert at all times for opportunities to broaden the use and improve the performance of their machines.

Motor Car Fatalities

Show Need for Increased Supervision

AN unusual number of recent accidents involving collisions between track motor cars and trains suggests strongly a need for increased supervision by maintenance officers. Of four recent fatal accidents, three were caused by failure to clear or protect against regular time-card trains, including two passenger trains running on time.

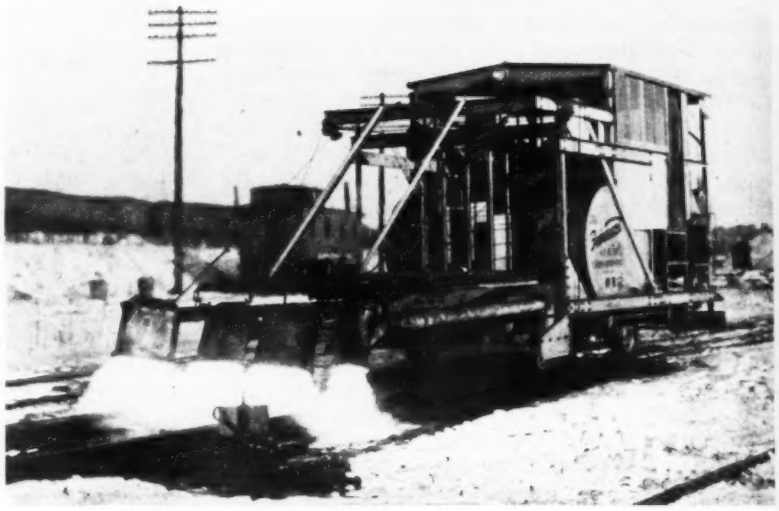
Copies of written "line-ups" were found in the possession of the foreman after each of the two fatal accidents involving passenger trains. In each "line-up" the train involved was reported on time, yet in both cases the motor cars proceeded against scheduled times of the trains. In the case of the other collision involving a time-card train, where it was impossible for the foreman to obtain information from the dispatcher, he attempted the movement of his car without adequate flag protection, assuming the train would be late because an opposing superior train was late. The fourth accident resulted from failure to obtain a train order protecting the movement, as required. None of these accidents would have occurred if those in charge had acted according to the rules governing the operation of track motor cars on the roads involved.

If, as seems evident from the circumstances surrounding all of these accidents, the men operating this equipment were ignorant of the rules or were "chance takers," it is a reflection on their immediate superior officers, whose duty it was to know that their men knew and obeyed the rules, and who should never have tolerated chance taking for any reason.

Roadmasters and track supervisors have a definite responsibility to teach and practice safety at all times. They must be certain by positive check that those working under them know and obey all rules pertaining to the safe use of equipment. This has always been important, and it is especially so under present heavy traffic conditions. There may be many occasions when a roadmaster or supervisor must be tolerant of the shortcomings of his men, especially in view of the pressure under which many of them are working today, but acts of carelessnes or disregard of safety rules are not among them, no matter how well intentioned. In these days of intensified war effort on the part of the railroads, when maximum safety of train operation is absolutely essential, and when manpower is at such a premium, no roadmaster or supervisor can render his railroad a greater service than to double or treble his efforts in the interests of avoiding accidents of all kinds.

Illinois Central Finds Weed Burners Are Effective

For about fifteen years the Illinois Central has been using weed burners for melting snow on its extensive Chicago Terminal division. At the present time five modern machines are regularly assigned to this work, and are proving highly effective in helping to keep the terminal open during heavy snow storms. This article reviews the road's experience with the weed burners in snow-melting service and describes the methods and practices that have been developed to insure that they will be used with maximum effectiveness



Model 55 Weed Burner Melting Snow at a Switch

TO ANY track maintenance man the sight of a weed burner moving along the right of way on a hot summer day is not one to arouse more than passing interest, although one might pause a moment and, while mopping his brow, observe with a practiced eye the efficiency and effectiveness with which the machine does its work. But if the same machine should be seen a few months later engaged in melting snow at switches in a large yard—and accomplishing as much work as 60 to 100 men with brooms—that would be a matter calling for the closest investigation, especially in view of the severe labor shortage now prevailing. Such, however, is the practice on the Chicago Terminal division of the Illinois Central where five modern weed burners are now regularly assigned to snow-fighting duty during the winter months. Hence, since these machines are all used in weed-destruction work during the summer, the road has managed to convert them into dual-purpose units with all the advantages inherent in such equipment.

Used for 15 Years

Weed burners have been used in snow-melting service on the Chicago Terminal division for nearly 15 years. While excellent results are being obtained at the present time, this has not always been the case. The melting of snow was a function so entirely foreign to the purpose for which the machines were designed that many things had to be learned before it could be said that they had been adapted to the new work with maximum efficiency. However, so thoroughly convinced was the road of the advantages inherent in the weed-burners for snow-melting work that, in spite of the early discouragements, it persisted in its efforts to adapt them to this work with results that have now more than justified the faith placed in them.

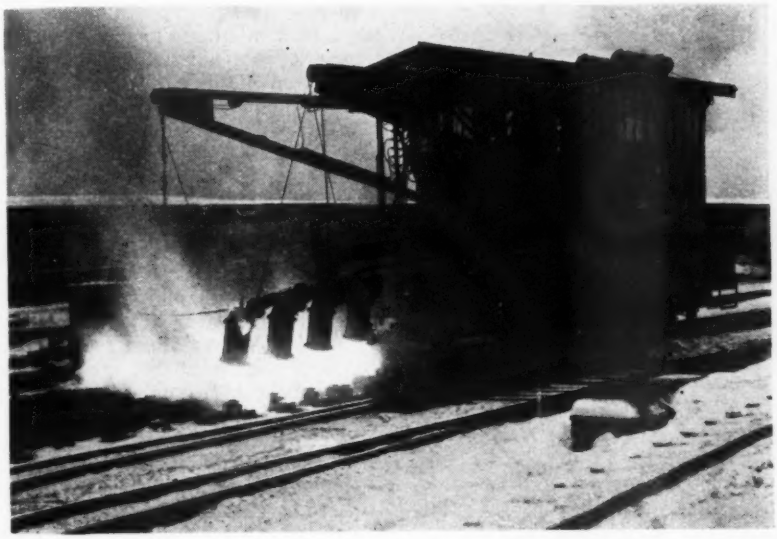
The Chicago Terminal division of the Illinois Central is an extensive and important property, embodying several freight yards, a number of engine terminals, a produce terminal, nine important interlocking plants, a large passenger station, and various lesser facilities. Among the freight-handling facilities is Markham yard which, with two humps and a corresponding number of receiving, classification and departure yards, is one of the largest gravity classification yards in the country. The other more important facilities include an extensive engine terminal at Twenty-Seventh street; the large Hawthorne yard and engine terminal; and the large yard at South Water street.

For many years switch heaters have been used extensively as one means of keeping the terminal open during snow storms. A number of the interlocking plants are equipped with electrical switch heaters and one is protected with steam coils. In addition, heaters of the oil-burning pot type are used extensively at several locations. But in keeping open the freight yards, engine terminals and related facilities, the road depends to a large extent on weed burners. To be specific, two burners are assigned to Markham yard (one for each hump), one is used at the South Water street yard, one at the Twenty-Seventh street engine terminal and one at Hawthorne.

The first use of a weed burner for melting snow on the Chicago Terminal division was made in about 1930, when an oven-type machine, which had been sent in for overhauling, was diverted to snow-fighting service at Markham yard. During the next several years three additional machines were assigned to this service, one at Markham yard, one at South Water street and one at Twenty-Seventh street, making a total of four. Two of these were oven-type machines and two were torch-type units.

The design and construction of these older weed burners were such that they did not lend themselves readily to adaptation for snow-melting service. In the first place they

Weed Burners as Snow Melters



A Model 57 Machine Operating as a Snow Melter

did not have sufficient tractive power to permit them to cope with all the conditions encountered in snow-fighting service. Another objection was that they afforded little protection from the weather for the operators. In spite of their shortcomings, these machines rendered valuable service, and the railroad became convinced that the idea of using them in snow-fighting work was essentially sound but that their performance would be greatly benefited if machines could be obtained embodying certain improvements over the older units.

Newer Models Obtained

Several years ago, when improved types of weed burners incorporating the desired characteristics were placed on the market, the railroad undertook a program to replace its older machines with the newer types. Specifically, a Fairmont Model 57 weed burner was obtained in 1937 and assigned to Markham yard in place of one of the older machines then in use there. In the following year the other original unit in use at Markham yard was replaced, also with a Model 57 machine. This model is a torch-type burner embodying eight torches that are mounted on two adjustable arms, there being four torches to each of the arms.

In 1940, still another of the older machines was replaced with a new burner, this one being a Model 55 Fairmont weed burner. In the fall of 1944 two additional Model 55 machines were obtained. Thus the road now has three weed burners of this model, one of which, when assigned for snow-melting service, is used at South Water street, another at the Twenty-Seventh street engine terminal, and the third at Hawthorne. The Model 55 weed burner is smaller than Model 57 and is designed somewhat differently. It has five torches, each of which is mounted at the end of a separate arm, the center arm being fixed while the two on each side are manually adjustable, both vertically and laterally. In preparing the burners for snow-fighting service, the center arm and torch on each of the model 55 machines are removed. The torches on these machines, it should be noted, are somewhat larger than those on the Model 57 and produce a hotter flame; thus the melting capacity is approximately equivalent to that of the larger units.

It should be repeated here that all the burners are employed in weed-destruction work on various parts of the system during the summer months and that they are sent to Chicago in the fall of each year for assignment to snow-fighting duty. The company maintains a work-equipment repair shop at that point, and the original purpose of sending in the machines was to have them overhauled and placed in readiness for the next summer's weed-destruction activities. Present practice is still to overhaul the machines but, in addition, such alterations are made as are necessary to adapt them to snow-melting service. In contrast with former practice, it is significant that four of the weed burners now in use were purchased by the Chicago Terminal division for fighting snow and are loaned to other divisions during the summer months.

Alterations Required

The weed burners start arriving at Chicago about September 1 and are usually all on hand by early November. In preparing them for winter service the burner arms of all the machines are placed and anchored in the proper position for snow-melting work. On the Model 57 machines the arms are fixed at such an angle that the four torches on each of them straddle one rail, that is, with two torches on each side of the rail. In preparing the Model 55 machines the middle burner arm, as already noted, is removed and the other four arms are fixed in such positions that there is a torch on each side of each rail. In all machines the torches when arranged for snow-melting work, are fixed at a height of about 14 in. above the top of rail.

When prepared for snow-melting service, both types of machines are provided with enclosures for the operators. In the Model 55 burners the enclosures are left in place the year around, except that the window panels are removed for summer service. However, to permit proper manipulation of the burner arms on the Model 57 machines, the enclosures on these units must be removed entirely before they are sent out for weed-destruction work.

Adequate Housing Necessary

One of the things that the road has learned about the use of weed burners for snow-melting service is the necessity of housing them properly. Obviously, it is not desirable to leave them in the open, but neither has it been found satisfactory to shelter them in buildings that are utilized for other purposes. For instance, the

burners have at times been housed in enginehouses, but the experience has been that, for one reason or another, it is not always possible to remove them on short notice, or perhaps they may not be in condition for immediate operation.

For these and other reasons it is felt that the best practice is to provide separate shelters for the burners. Accordingly, the two machines at Markham yard are housed in a frame shed, 40 ft. square, enclosed with asbestos-cement siding, which has a separate track and door for each machine. Built in 1943 especially for the weed burners, this shed has electric lights and is heated by a coal stove in which a fire is kept burning at all times during cold weather, the primary purpose being to keep the engines reasonably warm so that there will be no difficulty in getting them started. Fuel for the torches on these two burners is stored nearby in two 11,000-gal. tanks, so located that they can be filled by gravity from tank cars spotted on one of the tracks leading to the shed. For transferring oil to the tanks on the burners, each machine has a small pump, but these are supplemented at this location by a gasoline-engine-driven auxiliary pump installed in the weed-burner shed.



Shed in Which the Two Weed Burners at Markham Yard Are Housed

The weed burner assigned to the South Water Street yard is also housed in a shed specially built for this purpose. Similar shelters are planned for the machines assigned to the Twenty-Seventh Street and Hawthorne yards, but both of these units were received too late in the year to allow time for the shelters to be built for use during the present season. In the meantime there is no alternative but to leave the burner at Twenty-Seventh street in the open, while that at Hawthorne is being housed temporarily in the enginehouse at that point.

At all times during the winter season the fuel tanks of the weed burners are kept filled and the machines are otherwise maintained in complete readiness to go into action at a moment's notice. At Markham yard and at South Water street the fuel used is 24L furnace oil which, at the latter location, is delivered direct to the machine from a tank car. At Hawthorne and at Twenty-Seventh street the fuel used is 20L oil, which is obtained from the fuel oil storage tanks for Diesel-electric locomotives at these locations. On the Model 57 machines the fuel tanks hold 2,000 gal. each, while on each Model 55 burner the fuel tank has a capacity of 1,500 gal. On both types the capacities of the fuel tanks are such as to permit the machines to be kept in service more or less continuously for about ten hours.

Mechanics as Operators

The problem of securing qualified operators for the weed burners when used in snow-melting service has been solved with a high degree of satisfaction by assigning to this work mechanics who are regularly employed in the company's work equipment repair shop at Chicago. Thus, the road has the advantage of having operators who are thoroughly familiar with the machines and who are not only capable of operating them properly, but are also qualified to make emergency repairs in the field. When making such repairs, any spare parts that may be needed can be obtained from the stock that is maintained at the repair shop, and for the purpose of handling requests for parts the shop foreman is required to be on duty when the weed-burners are engaged in snow-melting work.

Two operators are required for each weed burner, one for operating the traction controls and the other for handling the torches. The two men who are regularly assigned to each burner are considered a part of the snow-fighting organization, and their names and telephone numbers appear on the lists of persons comprising that organization. These men are called for duty during snow storms at the same time as the section gangs. In addition to the two operators the crew for each machine includes a conductor-pilot and a fourth man who remains on the ground to observe and direct the movements of the machine. At Markham yard the fourth member of the crew of each burner is a section laborer, while at the other three locations he is the section foreman.

In the supervisor's territory that includes the South Water Street, Twenty-Seventh Street and Hawthorne yards, all snow-fighting activities are directed from a control office located at Fourteenth street. During snow storms when the crews of the weed burners have been assembled and the machines are ready for action, the procedure is for the foreman with each unit to call the control office by telephone to obtain instructions as to where he is to take his machine first. Thereafter, the foreman with each machine is required to call the control office every hour to receive further instructions. In this way the office exercises minute control over the movements of the burners and is able to direct them to critical locations as they develop.

To assure that the most effective use will be made of the machines and to minimize interference with yard operations, all their movements are directed in close collaboration with the operating department. In this connection, it is interesting to note that, whereas when the machines were first introduced for snow-melting service the reaction among yardmasters and trainmasters was that they would result in more or less serious interference with train and car movements, these officers quickly became "sold" on the burners as an effective means of keeping switches open under the worst possible conditions. As a consequence their general attitude now is one of eagerness to have the use of the machines as much as possible in their respective territories.

With reference to the method of operating the machines, there is a slight difference in the procedure followed between the two types of burners in use. In the Model 57 burners the four torches on each arm are so arranged that they cover several feet

of longitudinal distance, with the result that, with the machine stationary, the torches will melt the snow over a distance of about half the length of a set of switch points. Thus, when one of these machines moves up to a switch it is stopped briefly while the snow is melted from the points for half their length, and then is moved forward slightly to get the other half. The length of time that the machine must be held stationary at each stop depends to a large extent on the severity of the conditions prevailing, the maximum being about a minute.

With the Model 55 machines, on which there is a single torch on each side of each rail, the most effective procedure is to operate them at a slow constant speed throughout the length of the switch points, the rate of speed being judged by the operator on the basis of the conditions encountered. When moving between switches the machines proceed at a faster speed, but the torches are not cut out. The result, therefore, is that the burners melt a certain amount of snow between switches and thereby help to prevent drifting. In fact, if the snow is drifting badly, the burner, with wings spread somewhat, may be operated along a lead to melt the upper layer of snow on both sides of the track, thereby anchoring the snow by forming a crust on top of it.

Procedure at Markham Yard

It may be of interest to describe in some detail the manner in which the two burners are used at Markham yard. This yard contains about 114 miles of tracks, and has 506 switches and 173 retarders. Ordinarily one of the weed burners is assigned to each hump, and the experience has been that the two machines are sufficiently effective to keep the classification yards in operation under the worst conditions that are likely to be encountered.

During the beginning of a snow storm, it is the practice at the two humps to blow the snow away from the switches and retarders by compressed air, using hose lengths specially provided for this purpose, each in the hands of two men, one of whom acts largely as a lookout for the other. Ordinarily three hose crews are used at each hump, and if the snow is relatively light and isn't drifting too badly these men can keep the yard open. However, if the snow is wet and the fall is heavy, with a tendency to drift, the men with air hoses can't keep up with it, and the weed burners are brought into operation, releasing the blower crews for work elsewhere.

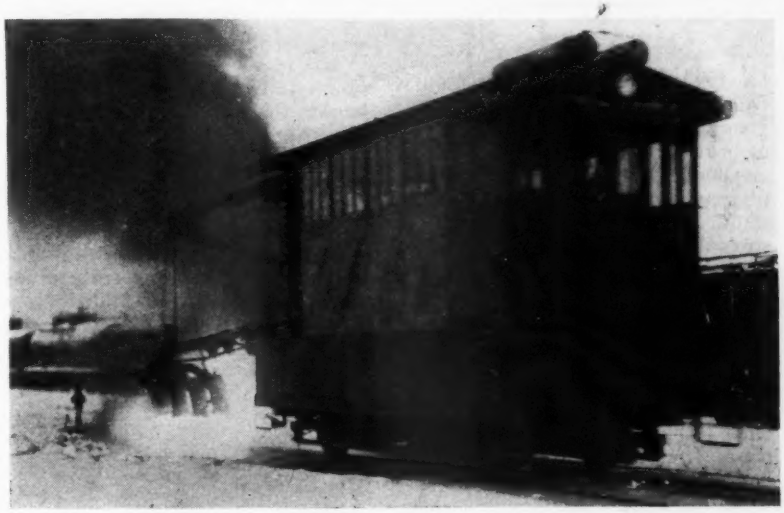
In operating the weed burners at the humps the objective is to keep the yards open while interfering as little as possible with the humping of cars. To this end there is the closest possible co-operation between the weed-burner crew and the hump yardmaster. The exact procedure to be followed during any particular storm depends entirely on the conditions prevailing at the moment. Generally the switches require attention first, and after these have been opened up the burner takes care of the retarders next. Occasionally, the humping of cars must be stopped for brief periods to give the burner an opportunity to get to the retarders and switches, but much of the snow-melting work can be done at times when it does not interfere with the operation of the hump, such as when the hump engine has gone back for another cut of cars or its crew is eating lunch. When the switches and retarders at one of the humps have been cleared of snow, it is frequently possible to utilize the burner at other points in the yard for a time before it becomes necessary to return it to the hump.

Generally speaking the regular operators of the burners are continued on duty for the duration of the storm, which means that sometimes they remain on duty for 16 hr. or longer, with occasional brief periods of respite to obtain warm meals. However, if the storm should last too long, it may be necessary to call other operators to relieve the regular crew.

Experience has shown that the weed burners are exceptionally effective in disposing of snow at switches, doing the work of as many as 100 men with brooms—and doing it better. When the work is done manually only sufficient snow is generally removed to permit the switch points to be operated, but the weed burners melt all the snow around and under the points and the bridle rods. Furthermore, the heat generated by the torches is such as to cause much of the moisture to be evaporated so that little difficulty is encountered due to the formation of ice.

In addition to the large-type burners, two small Woolery off-track weed burners were purchased in 1944, for burning weeds in yards. These are pushed by two men and are used off track or placed on a low underslung push car. These machines are now being used experimentally to melt snow on large brick platforms, and for melting the accumulation of snow and ice between the platform and the adjacent running rail. While they have been used for this purpose only during the last snow (prior to this writing), the results were sufficient to warrant further experiments with them.

The utilization of weed burners for melting snow on the Illinois Central is under the general direction of C. H. Mottier, chief engineer, C. M. Chumley, engineer maintenance of way, and G. M. O'Rourke, assistant engineer maintenance of way. P. H. Croft, division engineer of the Chicago Terminal division, has direct supervision over the operation of the burners, assisted by C. C. Pelley, track supervisor with jurisdiction over the South Water Street, Twenty-Seventh Street and Hawthorne yards, and W. H. Naas, track supervisor at Markham yard. The assigning of operators and the maintenance of the weed burners is under the general direction of R. E. Buss, superintendent of maintenance of way equipment of the road, and under the immediate supervision of C. E. Russell, water works supervisor of the Chicago Terminal division.



Another View of a Model 57 Weed Burner Melting Snow

Plant Produces More Than of Rock Ballast

To produce crushed rock in adequate quantities for re-ballasting work on its La Crosse and neighboring divisions, a large quarry and modern rock crushing and screening plant have been established on the Chicago, Burlington & Quincy at Wyalusing, Wis. This plant was designed to produce daily more than 1,000 tons of crushed rock ballast ¼-in. to 1-in. in size. While some trouble was experienced originally in obtaining sufficient production and also in keeping the proportion of fine material in the ballast down to a satisfactory percentage, the plant was later modified and enlarged to overcome these difficulties, and the largest day's run in 1944 was 1,925 tons, while the output for the season was approximately 150,000 cu. yd.

IN 1943, the Chicago, Burlington & Quincy opened a quarry and installed a rock crushing and screening plant to provide ballast for its La Crosse division, over which a large tonnage of freight traffic and much passenger traffic is operated, including the streamlined Chicago - Twin Cities Zephyrs. The plant was designed to produce 1,000 tons of finished ballast a day, ¼-in. to 1-in. in size.

The quarry is located alongside a double-track main line, one-fourth mile north of Wyalusing, Wis., and is served by a siding, which was extended from the house track at that point. It consists of 6.9 acres of rock bluff 100 ft. high, the rock being a white magnesium limestone, or dolomite, much harder than the usual limestone found in this vicinity. In the upper two-thirds of the quarry the rock has a slightly blue tint, while that in the lower third of it is very hard and has a slightly red tint. The rock has no seams up to within about 6 ft. of the top of the quarry face.

Original Plant

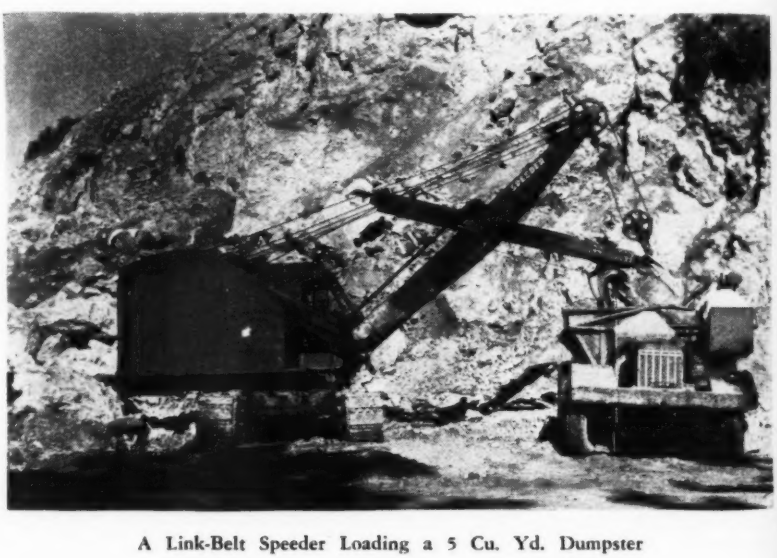
In the fall of 1942, a contract was awarded for operating the quarry and for producing 1,000 tons a day of rock ballast, ¼ in. to 1 in. in size, in accordance with A.R.E.A. specification No. 57. The contractor installed a ballast plant in the spring of 1943, consisting essentially of an apron-type feeder, a 20-in. by 36-in. primary jaw crusher, a 40-in. by 24-in. roll crusher, and a 4-ft. by 8-ft., three-deck gyrating screen. These units were connected by belt conveyors and, after installation, ballast production was started on May 16, 1943. This plant produced 40,000 cu. yd. of ballast during 1943, of which 32,000 cu. yd. were shipped and 8,000 cu. yd. were stock piled at the end of the season.

The results with this plant, however, were not entirely satisfactory to the railroad, because the output was about 60,000 cu. yd. short of the goal set. The largest day's run in 1943 was about 900 cu. yd. and the average production was about 600 cu. yd. daily, under good working conditions.

The reasons for the small production were two-fold; first, the rock was harder than the contractor had expected and the plant was too small. Secondly, difficulty was experienced in keeping the proportion of fines less than ¼-in. in size under the limit required by the specification, especially when the material was slightly wet. In passing through the plant, these fines would clog the screens, thus permitting too large a percentage of the subsequent fines to pass into the finished ballast. This condition would prevail for some time after rains, and usually as long as the material previously blasted down from the quarry face remained wet.

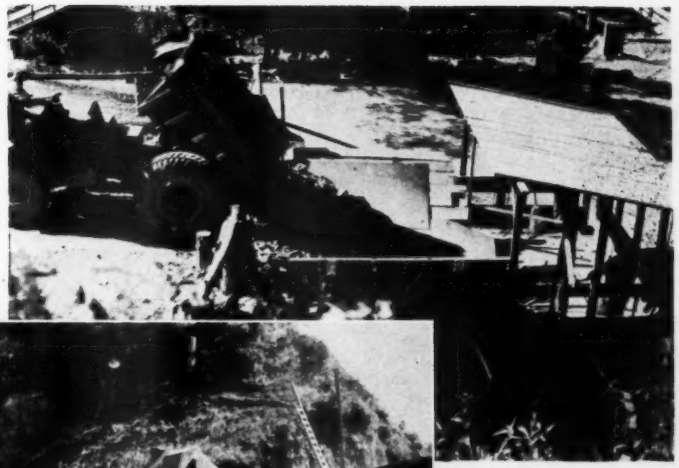
The cause of the fines was partially the inclusion of small nodules of sandstone, which occurred irregularly in much of the rock, and particularly in that from the upper portion of the quarry face. When the rock passed through the crushing plant, this sandstone was reduced to a fine sand, which coated the harder rock, and was very difficult to screen out, particularly when wet. Also, it was difficult to strip all of the dirt overburden of the rock, since the top of the rock bluff was hilly and the top strata irregular. In addition, the small size of ballast specified requires more crushing than for larger ballast which, in turn, creates more fines.

The operator of the plant also increased his difficulties somewhat by trying to get more production by heavily shooting the rock face to reduce the amount of crushing required. This increased the proportion of fines. Under good, dry conditions, however, little trouble was experienced, and the plant operated about as expected, except that its capacity was not large enough for the requirements.



A Link-Belt Speeder Loading a 5 Cu. Yd. Dumpster

1,000 Tons a Day





Above — A Dumpster Unloading Into the Hopper. An Apron-Type Feeder Conveys the Rock to the Primary Crusher (in Center of Platform at Right)

Left—General View of the Plant. The Unloading Hopper Is at the Right, the Primary Screen Can Be Seen Above the Truck and the Secondary Screen Is at the Top of Tower at Left.

In the fall of 1943, to insure the production desired in 1944, it was decided to modify the plant by adding a larger primary jaw crusher, using the old jaw crusher as a secondary crusher, and to add another larger three-deck gyrating screen to help remove the fines. Some additional belt conveyors were also planned. Because of delayed deliveries, the old plant was operated from April 17, 1944, until the middle of June, when the new equipment was installed and continued in operation until the end of the season.

With the old equipment, the production had averaged approximately 13 cars of ballast a day, with a maximum of 16 cars. With the new plant, production was expected to be about 28 cars daily, with a maximum of 33 cars. Actually, the maximum production that has been secured with the new plant has amounted to 27 cars, 1,481 cu. yd., or 1,925 tons, which was secured in two 10-hr. shifts on July 18. The average production, however, was greatly increased, and the total ballast production in 1944 was 150,000 cu. yd. Furthermore, the difficulties of producing ballast with a low enough percentage of fines were greatly lessened with the larger plant. Next year, with a full season, the new plant is expected to produce about 210,000 tons, or 3,230 carloads of ballast.

Description of Plant

The plant, as it now exists, consists essentially of an unloading hopper with an apron feeder, a primary 30-in. by 42-in. jaw crusher, a 4-ft. by 8-ft. triple-deck gyrating screen, a secondary 20-in. by 36-in. jaw crusher, a secondary 5-ft. by 12-ft. triple-deck gyrating screen, a 40-in. by 24-in. roll crusher, and numerous lattice-type belt conveyors. All of the equipment was mounted on wooden bents or platforms to avoid the use of steel.

The operation of the plant is as follows: The rock from the quarry is dumped into the unloading hopper, from whence it is fed by the 36-in. by 8-ft. apron feeder into the large primary jaw crusher, which is set to crush to five inches. From this crusher, the rock is unloaded into a second hopper, which feeds the crushed material uniformly onto a 30-in. lattice-type belt conveyor 65 ft. long, which, in turn, elevates and unloads it onto the top deck of the inclined 4-ft. by 8-ft. triple-deck gyrating screen, called the primary screen.

The top deck of this screen has 1½-in. square openings, the middle deck ½-in. square openings, and the bottom deck ¼-in. by 1-in. slot openings. The rock rejected by the top deck goes to the secondary jaw crusher, which is set to crush to a maximum of two inches. The rock retained on the second and third decks of the screen is by-passed around the secondary jaw crusher, while the fine material passing through the third deck is discarded. This fine material is collected in a hopper below, from whence it is hauled away by trucks and dumped.

The output of the secondary crusher and the material from the primary screen which was by-passed around this crusher, are deposited onto the lower end of a 24-in. lattice-type belt conveyor 140 ft. long, which extends to the top of a storage tower, where it is unloaded onto the top deck of the 5-ft. by 12-ft. triple-deck gyrating screen, called the secondary screen.

The top deck of the secondary screen has 1¼-in. openings and the second, or middle, deck has ½-in. openings. The bottom, or third deck, has a composite screen, the upper half of which has ¾-in. by 3/16-in. slots, while the lower half has ¼-in. by ¼-

in. openings. The material passing through all three screens is rejected and hauled away. The material passing through the top screen and retained on the middle or bottom screens goes directly into finished ballast storage hoppers in the tower, from whence it is unloaded through chutes into ballast cars spotted on an adjacent track. The material retained on the top 1¼-in. screen travels down a chute to the roll crusher, which has



The 365-Cu. Ft. Gardner-Denver Compressor. Note Men Doing Secondary Drilling

rolls 40 in. in diameter and 24 in. wide, set for 1-in. material. The output from this crusher is fed through a hopper onto an 18-ft. lattice-type return conveyor, which drops the material onto the long conveyor to the tower, and thence back to the secondary screen.

The ballast plant is powered by both Diesel and gas engines. The feeder at the unloading hopper and the large primary crusher are powered by a 150-hp. Caterpillar Diesel. The secondary jaw crusher and the roll crusher are each powered by 110-hp. Caterpillar Diesels. Other power units include a Twin City 45-hp. gas engine and a Case 50-hp. gas engine, which operate the screens and conveyors. All of the power units have V-belt drives.

Each of the jaw crushers has four SKF roller bearings, two on the pitman and two on the frame, which are Alemite lubricated and sealed against grit and dust. A high eccentric and radial toggle action of the crushers provides two distinct blows with each revolution of the eccentric shaft; a primary stroke at the top of the jaws and a secondary blow at the bottom.

In addition to the ballast plant itself, a large amount of other equipment is used, principally in the quarry, as follows: Eight dump trucks for hauling away the fines from the ballast plant, and for other miscellaneous work; and four five-cubic yard Koehring Dumpsters for hauling all the rock from the quarry to the ballast plant, which are loaded by two shovels—one a ¾-cu. yd. Link-Belt Speeder gas shovel and the other a 1¾-cu. yd. Northwest gas shovel.

Other Equipment

Two Bucyrus-Erie well-drilling machines are used on top of the bluff to drill holes for blasting. In addition, the contractor has two wagon drills, one a Gardner-Denver, and the other a Cleveland Pneumatic. For the secondary drilling of large boulders, and occasionally for work at the bottom of the quarry face to keep it vertical, air compressors and jackhammers are used. One 365-cu. ft. Gardner-Denver compressor, driven by a 130-hp. Caterpillar Diesel, is used with six Gardner-Denver S-55 jackhammers for most of this work. In addition, two portable Gardner-Denver and one portable Ingersoll-Rand 110-cu. ft., compressors are also used.

Because of the hardness and toughness of the rock, 30 ft. of the face at the bottom is loaded with 60-per cent fast-acting dynamite. The next 35 ft. is loaded with 40-per cent dynamite, and the remainder with 25-per cent dynamite. This loading arrangement has proved to be most satisfactory as it permits the lower part of the face to be shot out of the way before the upper part falls, and helps maintain a vertical quarry face. To avoid possible damage to equipment and interference with traffic on the railroad, the quarry was opened on the back side of the bluff, away from the tracks.

When the ballast plant is shut down at the end of the season, the quarry is used to produce rip rap during the winter, as much as 50,000 cu. yd. of this material having been produced in the winter of 1943-1944. For this work, a 1½-cu. yd. Marion gas shovel and a 1-cu. yd. American gas shovel are used, which are also available in the quarry for standby service when the ballast plant is being operated. A Caterpillar tractor with a cable attachment is used to move the loaded cars out of the way and to spot the empties.

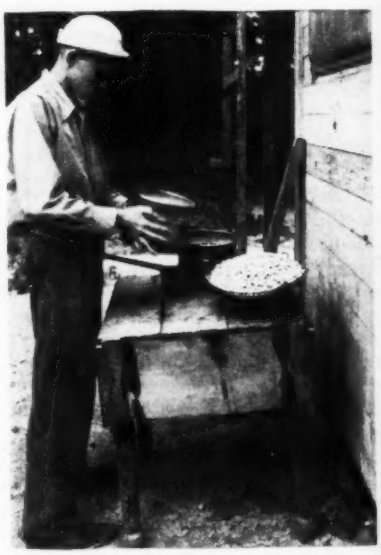
In addition to this equipment, the contractor has a machine shop and a blacksmith shop, with welding equipment, for making all kinds of repairs; two storerooms; a heated garage and a three-room office building. The railroad has a small building for its inspectors, where they can keep samples, make sieve analyses and keep their records.

During the working season, the quarry and ballast plant are operated two 10-hr. shifts daily, six days a week. A superintendent, quarry foreman and office manager are in charge for the contractor, and 20 other men are employed on each shift. Floodlights, connected to an REA power line, are used to light the quarry and ballast plant at night.

Inspection

The railroad has day and night inspectors on the job, and also an assistant inspector on the day shift. The inspectors have a set of standard sieves, with which they check the quality of the output twice during each 10-hr. shift. With the new enlarged plant, wet weather has not been as great a handicap as formerly, although with damp material the proportion of fines in the ballast increases to some extent even with the new plant.

The specifications call for 100 per cent of the ballast to pass through a screen with 1½-in. square openings; 90 to 100 per cent to pass a screen



The Assistant Ballast Inspector Making a Sieve Analysis

with 1-in. square openings; 25 to 60 per cent to pass a screen with ½-in. square openings; 0-10 per cent to pass a No. 4 mesh (about ¼ in.) screen; 0-5 per cent to pass a No. 8 mesh (about ⅛ in.) screen; and 0 to 1 per cent to pass through a 200 mesh (very fine) screen. The average analysis of the ballast in dry weather is approximately as follows:

Less than ⅛ in.	1.8	per cent
⅛ in. to ¼ in.	2.5	" "
¼ in. to ½ in.	33.7	" "
½ in. to 1 in.	53.0	" "
1 in. to 1¼ in.	10.0	" "

In wet weather the average analysis is about as follows:

Less than ⅛ in.	3.0	per cent
⅛ in. to ¼ in.	6.5	" "
¼ in. to ½ in.	39.5	" "
½ in. to 1 in.	42.0	" "
1 in. to 1¼ in.	9.0	" "

The critical problem in the control of this plant has been to keep the portion of fines less than ¼ in. in size from exceeding 10 per cent, particularly following wet weather. When the small plant was first started, it was found that the clogging of the screens could be avoided somewhat by using slotted screens. With the larger plant, using an additional 5-ft. by 12-ft. triple-deck screen and slotted screens in the bottom deck of both screens, this difficulty was almost completely overcome, except with very wet material and, in such cases, the plant is usually shut down temporarily.

Use of Ballast

Practically all of the ballast prepared at the plant described has been used for surfacing track out-of-face, and most of it has been used on the La Crosse division. This division consists of a double-track main line extending between Savanna, Ill., and the Twin Cities (St. Paul, Minn., and Minneapolis). Some of the ballast however, has been used on a secondary main line south of Savanna, which handles a heavy tonnage of coal and other freight, and on the main line east of Savanna, over which the Twin Cities-Chicago Zephyrs operate.

The Burlington has been well pleased with the rock ballast secured from the plant at Wyalusing, particularly since the plant was improved in 1944. The ballast from this plant has been inspected thoroughly and has been of uniformly good quality and, although a larger production was desired initially, in no case has quality of output been sacrificed for the purpose of securing a larger volume of production.

The selection of the quarry and installation of the ballast plant were under the general direction of H. R. Clarke, chief engineer; G. A. Haggander, assistant chief engineer, and E. J. Brown, engineer of track, of the Burlington Lines. Railroad supervision and inspection of the ballast have been under the direction of W. J. Harris, division engineer, Chicago, Burlington & Quincy, La Crosse, Wis. The contract for operation of the quarry and ballast plant is held by the E. C. Schroeder Company, Inc., McGregor, Iowa, and the ballast plant equipment was furnished by the Universal Engineering Corporation, Cedar Rapids, Iowa.





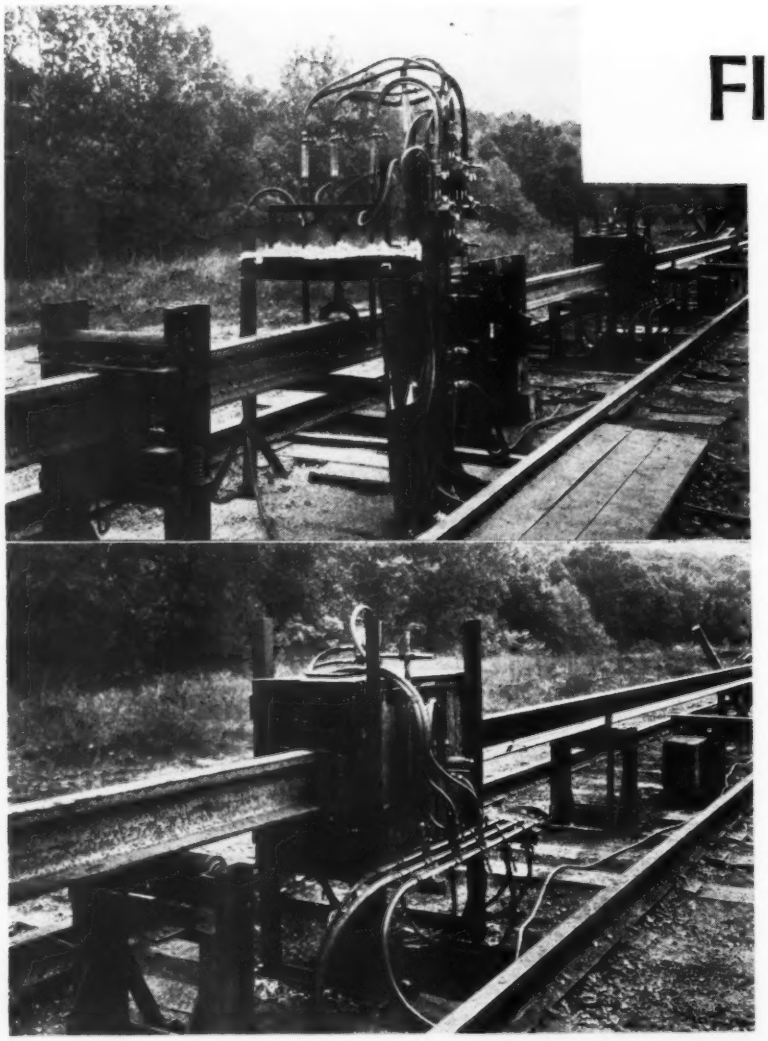


Army Track Forces in Italy Are Strong for Mechanization

THAT our railway units at the fighting fronts are demonstrating a high degree of ingenuity in adapting themselves to conditions as they find them, especially in the application of mechanized methods, is revealed by these views showing activities of Company "A" of the 713th Railway Operating Battalion, Military Railway Service, which were taken in Italy. Since screw spikes are used extensively in railway track in Italy, the two portable electrically-driven wrenches shown in the top view were improvised from salvaged equipment to speed the work of driving such spikes. That air tools are also used is indicated by the middle view which shows a track crew operating a pneumatic tie drill and a screw-spike wrench, both driven from a 2½-ton motorized air compressor. Shown at the bottom is a half-track truck used for furnishing anti-aircraft protection and rough-ground transportation for an oxy-acetylene cutting outfit. The 713th Railway Operating Battalion is sponsored by the Atchison, Topeka and Santa Fe

Flame Cleans

Motivated by an increase in recent years in the number of rail head and web separations occurring in paved road crossings and tunnels, which have been attributed partly to the effects of corrosion, the Norfolk & Western has started the practice of flame-cleaning and oiling all rails destined for use in such locations. As described in this article, special equipment has been devised for applying this treatment in an effective and economical manner, and somewhat similar equipment has been developed for treating joint bars



Top—The Unit in the Center of This Photograph Is the Flame-Cleaning Machine. Above—The Rails Are Sprayed With Oil as They Pass Through the Box Shown in This View



Fatigue Cracks Are Plainly Visible in This Section of Rail Removed from a Tunnel

TO PREVENT the corrosion of rails in tunnels and paved road crosings, the Norfolk & Western has inaugurated the practice of flame-cleaning and oiling all such rails before installation, the work of processing the rails being done with equipment that has been especially developed for this purpose. It is estimated that rails treated in this manner will have a service life at least 25 per cent longer than if they were installed untreated. The equipment devised for processing the rails is still somewhat in the development stage, having been constructed largely of second-hand material. At present the cost of treating the rails, exclusive of handling charges, is about three per cent of their initial cost, but it is expected that this percentage will be reduced as further improvements are incorporated in the equipment.

This company has also flame-cleaned and oiled a number of new joint bars for test in an effort to reduce the loss of bolt tension by removing mill scale and preventing corrosion. It has also given the same treatment to several thousand second-hand joint bars.

Corrosion Causes Failures

The decision to do something about the corrosion of rails in crossings and tunnels came about as the result of an increase in recent years in the number of head and web separations occurring at such locations. As a result of an investigation of this phenomenon it was concluded that corrosion was playing an important part in causing the failures. Stress measurements made on other roads had shown that 131-lb. RE rail (which is standard for use in main-line track on the Norfolk & Western), develops high tensile stresses in the web near its juncture with the head, these being attributed to eccentric vertical loads. Under ordinary conditions these stresses are not generally sufficient to cause cracks to appear, but on the Norfolk & Western it was concluded that where corrosion is present it will cause stress concentrations that eventually may result in fatigue cracks. Thus, it was reasoned that the corrosive conditions present in paved road crossings and in tunnels were an important contributing factor in causing the head and web separations. Also, bolt-hole cracks, attributable at least in part to corrosion, were occurring to some extent in road crossings and tunnels, and, furthermore, wherever corrosive conditions were present they were causing damage to the rail in other forms.

and Oils Rails

for Road Crossings and Tunnels

As a means of protecting them against corrosion, it has been the practice on the Norfolk & Western to spray the rails and fastenings in tunnels with oil following their installation, and repeat this procedure annually during the life of the rail. However, while affording some protection, it was found that the coatings thus applied were prone to loosen and come off. This was especially true in wet tunnels where the oil sometimes peeled off in large sheets, leaving the rail exposed to corrosive action. Furthermore, when spraying rails and fastenings in track it is not possible to apply oil behind the joint bars or to the underside of the base of the rail.

Effects of Mill Scale

Failure of the oil film applied to rail in track was attributed largely to the presence of mill scale on new rail. When a preservative film is applied over the mill scale, the latter is apt to come off eventually, taking the protective film with it. It was also discovered that moisture is frequently present under the scale, and that in some instances when the scale is removed from new rail there is evidence that corrosion is already taking place. It thus became apparent that, unless the rail is completely dehydrated before oil is applied, the moisture will be sealed under the coating and that, hence, corrosion will take place even though the oil film remains intact.

These various findings led the railroad to the conclusion that, if a protective film applied to rails and fastenings is to be effective, the mill scale must first be removed and the metal dehydrated. Various methods of accomplishing this were investigated, including the use of wire brushes and of sand blasting. However, both of these procedures were discarded because it was reasoned that they would be too expensive and that, furthermore, there would still be the problem of dehydrating the rail.

Flame Cleaning Found Best

The method that seemed to offer the greatest possibilities was the flame cleaning of the rails with oxy-acetylene torches, of which an inherent feature is the dehydration of the surface being cleaned. In the flame-cleaning process, any scale that is present is heated rapidly to a high temperature in the course of which it is caused to expand and thereby to become loosened from the parent metal. In this process some of the scale drops off, and the greatest part of the remainder is loosened to such an extent that it can be removed with wire brushes. Any scale adhering so tightly to the metal that it is not removed by the flame-cleaning and brushing process is not likely to come off at any time. For this reason, and because any remaining scale is thoroughly dehydrated, it is not likely to be a factor in causing corrosion when covered by an adequate preservative coating.

For about three years the N.&W. has followed the practice of flame-cleaning and oiling the stocks of relayer rail that it maintains at a number of locations throughout the system for emergency purposes. When these rails are removed from the track, most of the mill scale has been knocked off but some rust is present, and it is largely for the purpose of removing the rust and dehydrating the metal that these rails are flame cleaned before being sprayed with oil.

As a result of its investigation of the corrosion problem, the railroad decided to adopt the practice of flame cleaning all rails to be installed in crossings and tunnels before applying the protective coating. The problem remained of developing equipment for doing the cleaning and spraying work in an efficient and economical manner. In the beginning, an attempt was made to flame-clean rails with hand torches but this proved to be a slow and costly process. One objection to the hand work was the fact that, because of the lag between the flame-cleaning and spraying processes on some parts of the rail, all the surfaces did not always remain completely dehydrated until the rail was sprayed.

Because of these considerations it was decided to build special mechanized equipment for doing the work, this equipment to consist of the necessary units for flame-cleaning the rail, for removing the loosened scale,



Gasoline Driven Winch and Sheave Blocks Used to Pull Rails Over the Production Line

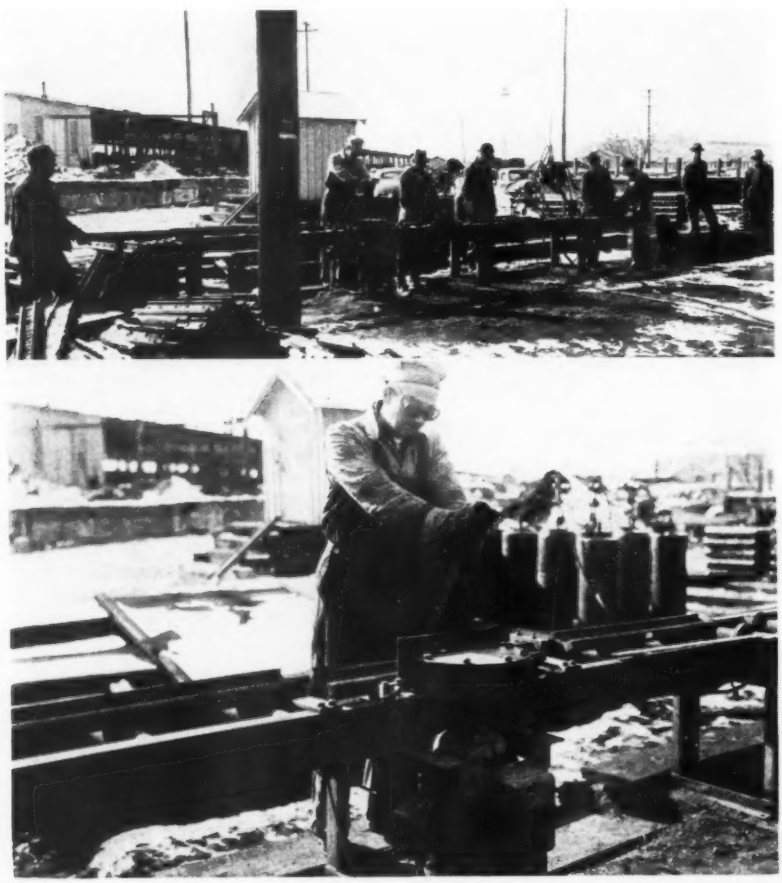
and for spraying all surfaces of the rail with oil—all these to be mounted together in a production line over which the rail would be moved on ball-bearing-mounted rollers. The flame-cleaning and oiling outfit was developed and installed at the company's roadway material yard at West Roanoke, Va. Since many of the rails to be treated in this manner must be previously butt welded, either in double-lengths for installation in road crossings or in longer lengths for use in tunnels and elsewhere, it was decided that the best location for the treating equipment would be at the leaving end of the production line for the butt-welding work. The method used on this railroad to weld rails end to end is the Oxweld automatic pressure rail-welding process.

Equipment Described

The equipment developed for treating the rails is such that the various units incorporated in the production line are stationary and the rails are moved through them at a uniform rate of speed on rollers that are mounted at the same height as those in the conveyor line for the welding process. The first unit is the flame-cleaning machine, which consists essentially of four specially-designed oxy-acetylene heads mounted in a frame of structural angles, together with the necessary mixer tubes and controls. The flame-cleaning heads are designed and arranged in such a manner as to reach all surfaces of the rail. They have No. 64 drill orifices, placed on ¼-in. centers, and are used in connection with No. 100 mixer tubes. The oxy-acetylene heads are cooled with water that circulates through a closed circuit in which is incorporated an automotive radiator through which air is forced by a motor-driven fan.

In order that the rail will be guided accurately through the flame-cleaning machine in such a manner that it will not strike and damage the oxy-acetylene heads, a set of vertical and horizontal ball-bearing rollers was placed in the production line directly ahead of this machine. For guiding the rail laterally, there are two vertical rollers, one on each side of the rail. Since butt welds formed by the Oxweld process produce a slight downward bulge in the base of the rail at the joint, it was apparent that, if the horizontal roller directly ahead of the flame-cleaning machine were mounted rigidly, it would cause the rail to rise somewhat and perhaps thereby to strike the upper oxy-acetylene head. To prevent this, the horizontal roller was installed on a mounting incorporating a coil spring at each end, so that it would be pushed down slightly as each joint weld passes over it. To assure that the bulge in the rail base at each weld will not ride over this roller without forcing it down, another horizontal roller, this one with a rigid mounting, was placed above the rail to keep it from rising.

Directly beyond the flame-cleaning machine in the conveyor line is a second stationary frame which embodies a series of steel brushes for removing loosened scale from the rail. There are ten brushes in this frame, which are so mounted in various positions that they reach all surfaces of the rail. Each of them has a spring mounting so that at all times they will be applied to the rail with the necessary pressure to remove the scale.



Top—General View of the Production Line for Reclaiming Joint Bars. Bottom—Close-Up of Equipment for Grinding Depressions in the Tops of Bars

Spraying Device

The next and final unit in the flame-cleaning and oiling set-up is the device by means of which the rail is coated with oil as it moves along on the conveyor line. This is essentially a closed metal box, mounted in a frame of steel angles, with an opening at each end for accommodating the rail. These openings are rectangular in shape but are fitted with pieces of flexible material in such a manner as to reduce them to the approximate shape of the rail section. Oil is applied to the rail as it passes through the enclosed box by four spray heads, one of which is mounted in each side of the box in such a manner that all surfaces of the rail will receive a uniform coating. These are automatic spray heads of the same type that are used in paint-spray guns, and are so designed that the needle valves governing the flow of oil from them is controlled by means of small air cylinders operated simultaneously by a single control valve.

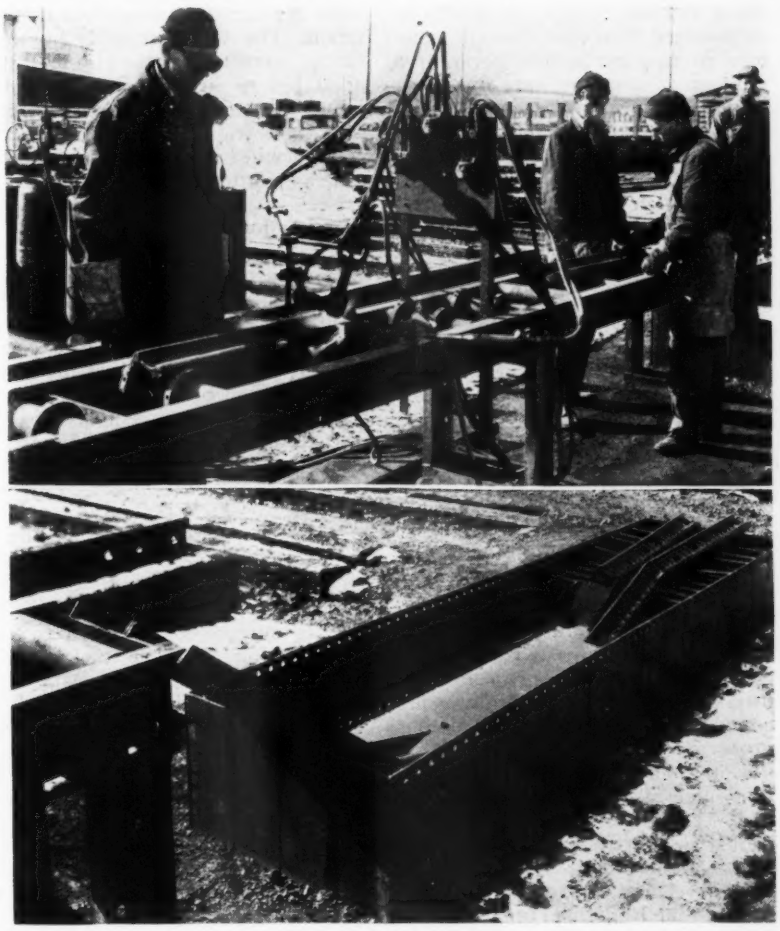
The preservative coating that is applied to the rails is known as Texas No. 45 oil, which contains 45 per cent asphalt. This oil is kept in an old locomotive air reservoir, located adjacent to the spray box, in which the pressure is kept at about 20 lb. per sq. in. by means of a pres-

sure regulator. A master valve controls the flow of oil to the four spray heads, but the lines to the individual heads are manifolded from a single pipe and a separate valve is provided at each of these connections. A second pressure regulator, also with a master valve and separate valves for the lines to the individual spray heads, is provided for controlling the air pressure for the spray gun. The master air valve and the valve for controlling the air that actuates the needle-valves in the spray heads are both mounted on the frame of the flame-cleaning machine so that the operator can control the torches and the spray operation from a single position.

Rate of Movement

To assure that the rails will be cleaned and dehydrated properly, it is necessary that they be moved through the flame-cleaning machine at a uniform speed, which depends somewhat on the temperature of the rail. In the flame-cleaning process the rail reaches a temperature of about 140 deg. F. and the heat thus introduced into the rail accelerates the drying of the oil. During cold weather the rails can be moved through the cleaning and spraying equipment at a rate of about 20 ft. per min. When the work is done during warm weather the speed may be increased somewhat. In the interests of achieving complete dehydration it is desirable to do the work when the humidity is relatively low.

When short lengths of rail are being cleaned and sprayed they are drawn through the equipment by a motor-operated winch which is controlled by means of push buttons mounted on the flame-cleaning frame. Recently, when strings of rails 1,014 ft. long were butt welded and then subjected to the flame-cleaning and spraying process, a gasoline-engine-driven hoist was used for drawing them over the conveyor line. To reduce the rate of travel to that suitable for the treating process and to provide sufficient power to move the long rails, a block and tackle with three sheave blocks was introduced in the pull line. To permit this line to be attached to the rail, a special clamp was developed which incorporates a cam in such a manner that, as the strength of the pull is increased, the grip on the rail becomes tighter. With this pulling arrangement it was necessary to move the clamp to a new location every time the rail was moved forward one rail length. Eventually it is hoped to introduce a motor-driven pulling arrangement for long rails so that the movement of such rails can also be controlled by push buttons at the flame-cleaning machine. Incidentally, the production line for the butt-welding and flame-cleaning and spraying operations is about 800 ft. long.



Top—Flame-Cleaning the Back Side of a Joint Bar. Bottom—Oil Tank for Dipping the Joint Bars. When a Bar Is Pushed Down the Incline Another Bar Is Forced Up on the Drain Board at the Opposite End

Since the 1,014-ft. rail lengths were destined for installation in a tunnel, it was necessary to load them on a string of 26 flat cars, and the loading work was performed simultaneously with the other operations, the flat cars being spotted on a track located directly in line with the production line. To guide the rails onto the flat cars the rollers approaching the cars were mounted on an incline. This project required the welding of two of the long strings of rail, and when the first of these had been welded and partially loaded, the second was coupled to it, with the result that at one time a 1,400-ft. length of rail was being pulled over the production line and onto the string of flat cars which, incidentally, were spotted on a curved track.

Located adjacent to the production line just short of the flame-cleaning machine is a set of rail skids, served by a yard track, over which single rails are handled to the treating equipment. Immediately beyond the cleaning and oiling outfit is another set of skids for receiving treated single and double-length rails as they come from the production line.

It is considered desirable to allow the treated rails at least a week in which to dry before they are laid. The plan is to maintain a stock of treated single and double-length rails on hand so that they will have ample opportunity in which to dry thoroughly before being installed. It is interesting to note in this connection that the preservative coating applied to the rails has very much the appearance of paint when it is thoroughly dry.

When rails were being flame cleaned and oiled by hand, it was found that five men could treat an average of about 30 rails a day. In contrast, using the special equipment described, a crew consisting of one operator and four laborers can treat

about 150 rails a day. It should be emphasized here that the equipment now in use, while incorporating a number of improvements over that originally developed, is still somewhat in the experimental stage. As further improvements are made it is only logical to expect that the speed of operation will increase correspondingly.

During 1944, which was the first year of operation for the new equipment, a total of 1,000 butt-welded rails were treated; an additional 500 new single 39-ft. rails were treated for use in the shorter road crossings and in tunnels; and 500 relayer rails were flame-cleaned and oiled for storage. Also, an additional 276 new rails were treated for another railroad.

Test Sections in Tunnels

In 1944, this company installed two test sections of butt-welded rails in tunnels for the purpose of determining the economy of this type of construction. This test is also being used as a means of determining the comparative corrosion - inhibiting properties of plain Texas 45 oil on the one hand and, on the other, of this same oil with an inhibitor added. These test sections were installed in two tunnels on the company's double-track main line between Welch and Iager, W. Va. One test is in the Roderfield tunnel, which is 924 ft. long, portal to portal, while the other is in the Vaughn tunnel, which is 1,113 ft. long. Both tunnels are on a tangent alinement and are separated by a half mile of tangent track. In both cases the test section is located in the westbound track so that the operating conditions will be strictly comparable.

In the Roderfield tunnel the existing rails in the westbound track were replaced with new 131-lb. RE rail butt-welded into continuous lengths throughout the tunnel, these being the 1,014-ft. lengths that were mentioned previously in connection with the description of the flame-cleaning and oiling process. In this procedure, one of these lengths was sprayed with plain Texas 45 oil, while the other was coated with Texas 55 oil with an inhibitor added. After the rails had been laid they were given a second coating, using the same oil in each case that was applied initially.

In the Vaughn tunnel, the new rails installed in the westbound track are of 131-lb. RE section butt-welded into pairs, with these lengths joined by standard fastenings. In this tunnel all the new rails were treated initially with plain Texas 45 oil and were again sprayed with this same material following their installation. The joint bars applied in this tunnel were also flame-cleaned and oiled before installation. In both tunnels it is contemplated that further applications of the preservative coating will be applied from time to time as required.

Treating Joint Bars

In connection with the practice of flame-cleaning and oiling joint bars, mentioned briefly at the beginning of this article, the N.&W. is experimenting with a method of preventing bars from breaking by grinding a depression or easement in the top of each bar at the center. This road is now using 36-in. 131-lb. angle-type head-contact joint bars. A few of these bars have broken in service. Examination of the broken bars has shown that in nearly every case a progressive fracture had started at a shoulder that is worn in the top bearing surface under service conditions. Joint bars in track where traffic is in one direction usually are worn more on the receiving end, this probably being partly due to the greater impact on the receiving rail. The cutting action that occurs at the ends of the rails as they expand and contract is probably an important factor in producing the shoulder. Opinion on the N.&W. is that stress concentration at the shoulder has a tendency to start cracks at this point, which eventually cause the bar to break.

The railroad had a large number of second-hand joint bars on hand which it desired to use with relayer rail. There was some question as to whether cracks had started in these bars, although very few cracks could be found by visual inspection. It might have been possible to locate any cracks by Magnaflux, but this method would have been slow and would not have shown the depth of the cracks. It was decided, therefore, to try to find the cracks by grinding an easement about 1½ in. long by 1/16 in. deep at the center of the top of each bar. A preliminary test of grinding an easement in a few thousand bars showed that some of the cracks, being less than 1/16 in. deep, could be removed by grinding, so that these bars which otherwise would have been scrapped could be salvaged. The cracks in more than 10 per cent of the bars were more than 1/16 in. deep and, hence, were not removed by the grinding operation. This operation seemed to be the most economical method of locating the cracks. It was also believed that grinding an easement would prevent the formation of a shoulder, thereby retarding the starting of new cracks. As a result of this investigation, the road is considering adopting the practice of grinding an easement on all used joint bars to be salvaged.

Another outgrowth of the investigation was the belief that an easement at the center of the top of new joint bars might retard the formation of cracks. Tests made by others indicated that the fatigue strength of the decarburized metal on the surface of the bar was less than the sound metal underneath. Therefore, it was decided that it would be better to make the easement by grinding. A test installation was made of 1,000 new joints each having an easement about 2 in. long by 1/16 in. deep. Some of these bars have already been removed from track as a result of rail renewals. No cracks have been found in any of the 169 bars which have been inspected to date. As a result of this test, the road is now considering a further test involving a larger number of new joint bars with ground easements.

Joint Bar Machine

A machine has been built for grinding an easement in joint bars and flame-cleaning and oiling them. This device embodies a frame of steel channels with 21 ball-bearing conveyor rollers on 16-in. centers. The grinding unit is a 5-hp. vertical ball-bearing motor on which is mounted a 10-in. by 1½-in. grinding wheel. The joint bars are laid on their sides and are pushed against the grinding wheel by a lever which also oscillates each bar ½ in. longitudinally. Adjustable stops are provided to regulate the depth of the easement as the grinding wheel becomes worn.

The flame-cleaning unit consists, at present, of three water-cooled oxy-acetylene flame-cleaning heads having No. 68 drill orifices on ⅛-in. centers. A 2-in. head cleans the top of the bar, a 4-in. head cleans the bottom fishing surface, and a 2-in. head with extra side flames cleans the inside of the web. A fourth head is to be added for cleaning the outside of the bar. Each torch is controlled by a double quick-acting shut-off valve and needle valve to adjust the oxygen and acetylene on the control panel. The cooling water is pumped through a radiator having a motor-driven fan. Anti-freeze is used to prevent the water freezing in winter. The joint bars are guided through the flame-cleaning heads by means of collars on the rollers.

For applying oil to the bars a dip-

(Continued on page 164)

Maintaining Water Service Facilities—

POWER UNITS

Part II

No. 10 of a Series

This installment of a two-part article on power units gives particular attention to the care and upkeep of internal combustion engines, including detailed reference to lubrication, fuel and ignition systems, the replacement or repair of worn parts, carbon removal and the grinding of valves, and also includes some helpful pointers on safe operation. Steam heads and wind mills are similarly treated. Future articles in the series will discuss the transmission of power, pump control, pipe lines, valves, hydrants, tanks, water columns, etc.

By C. R. KNOWLES
Superintendent Water Service (Retired)
Illinois Central, Chicago

THE PRINCIPAL difficulties encountered in the maintenance of internal combustion engines are due to their being operated by inexperienced employees, often in connection with other duties, instead of by a regularly assigned pumper. As a result, the engines are given but little attention other than that required to start and stop them. Other details of operation, such as lubrication, packing, necessary adjustment of moving parts, control of cooling water and cleanliness, are usually neglected or performed in a haphazard manner. While conditions have improved to some slight extent with more modern engines and a better knowledge of their operation, there is still much room for improvement in part-time operation. A great deal of the expense for maintenance could be eliminated if the operators would give these engines the same attention they give their automobiles.

It is only fair to say that some few of these operators handle the engines in a satisfactory manner, but, unfortunately, the great majority of them display little interest in their operation. In many cases engines are neglected to the extent that their performance is unsatisfactory, and almost constant maintenance is required. Very often this expense is in excess of the cost of employing a competent, full-time operator. Every effort should be made to educate these part-time operators in the care and operation of these facilities.

Lubrication

There is no detail of operation that has a more direct relation to the maintenance of an internal combustion engine than lubrication. The methods of lubrication are not the same with all engines. In some, separate oil or grease cups are provided for the main operating parts of the engines; in others, a pressure feed system is used to supply oil to the main bearings, connecting rod bearings, piston pin bearings, and to the water pump, valve rocker arms and other bearings. The cylinders and pistons are lubricated by means of the oil thrown off from the connecting-rod and main bearings. All of these facilities should be maintained in the best possible condition so that there will be no interruption to the regularity of lubrication. The oil must be kept clean and free from any foreign matter. This applies equally to oil cans and other containers, oil wells, oil and grease cups and oil lines. Where oil filters are provided, they should be inspected frequently by the water service repairman and cleaned by the pumper as often as necessary. The frequency of cleaning will vary with the requirements of each particular service.

Four-cycle engines are sometimes lubricated by the splash system, from oil contained in the crank-case. The cylinder and the connecting-rod and crank-shaft bearings are lubricated by the splashing of the oil about in the crank-case. After continued use, this oil becomes dirty and is thinned out; a part of it is lost. When this condition is reached, the oil should be drained from the crank-case and new oil applied. Additional oil is sometimes added to the old oil, but it is best to renew all of the oil and clean the crank-case thoroughly when the new oil is inserted.

Second only in importance to the regularity of lubrication is the quality of the oil used. The determination of the quality of the oil is not primarily a question of price, but rather the selection of the most suitable oil for the particular engine, regardless of price. The high temperatures and speeds of internal combustion engines demand the use of the correct grade and kind of oil. It is good practice to use only the type of oil specified by the manufacturers, as their specifications are based upon exhaustive tests with their particular design of engine.

Fuel and Ignition Systems

The fuel and ignition systems of any internal combustion engine require careful attention by both the pumper and the water service repairman to be sure that there are no loose bolts, nuts, screws, or electrical connections, and that there are no fuel, lubricating oil or water leaks. Tinkering with the carburetors, magnetos, timers or the fuel injection system by the pumper or others should be avoided, as when once correctly adjusted they will give little trouble. Any necessary adjustments should be made by an experienced water service repairman.

The pumper should inspect the fuel tanks and fuel piping frequently to insure against leaks. Every precaution should be taken to prevent the ac-

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cumulation of oil and gases in pump pits and closed places to avoid the hazard of fire or explosion. A break in the fuel line may be repaired temporarily by soldering, welding or other means, but the broken pipe should be replaced with new piping as soon as possible. Extreme care must be exercised in soldering or welding



This View Shows a Steam Boiler at Right and a Steam Head in Left Background

leaks in fuel tanks or piping. All traces of the fuel oil or gasoline must be removed before applying a torch or soldering iron. This can be done by filling them with hot water at least twice to remove the oil and drive out the gas fumes.

As a rule the electrical equipment required for ignition and for starting the engine requires very little attention. Where dry cell batteries are used, they should be tested occasionally by the water service repairman and renewed as required. In renewing batteries, all dry cells should be replaced, as one depleted cell in a battery will produce the same effect as regards amperage as if all are exhausted.

The pumper should check wet batteries daily, and apply additional distilled water as required to keep the water at the desired level. Pumpers should not operate starters operating on wet batteries for periods of more than 30 seconds, with a rest of five minutes between each three periods of cranking to allow the batteries to recuperate. All wiring should be insulated and all connections should be kept tight. Makeshift wiring and connections should be avoided. Magnetos, generators and starting motors should be kept clean and carefully lubricated in accordance with the manufacturers' instructions. Too much oil is as bad as not enough, as it is important to keep them free from excess oil and dirt.

Engine Maintenance

Water service repairmen should make necessary adjustments to such bearing parts as are provided with means to take up the wear. Other parts worn beyond repair should be renewed before complete failure to avoid delays and interruption to service. Loss of compression between the cylinder wall and piston, resulting from wear, is compensated for by piston rings fitted into grooves in the pistons. Broken rings or rings that are worn to such an extent that loss of compression occurs, may be readily replaced, while their application is comparatively simple. A certain amount of care is required, however, to avoid breaking the rings.

Before placing a new ring on a piston, the water service repairman should fit it to the cylinder to see that the ends do not come together tightly. There should be an opening from 0.02 to 0.04 in. between the ends, depending upon the size of the cylinder, to provide for expansion when the engine is hot. The piston rings should move freely in the grooves but should not have any lateral play.

If the old rings stick in the grooves, kerosene should be used freely to wash the carbon out until they move freely. If they are badly stuck, heat may be applied, together with the kerosene. The grooves should be carefully cleaned before applying new rings and the rings tried in the grooves to be sure that they will not stick or be too loose. If old rings are reused, they should always be replaced in the grooves from which they were removed. Pistons and rings should be well lubricated before inserting the piston in the cylinder, to avoid the possibility of scoring the cylinder.

The water service repairman should use care in removing the cylinder head and crank-case plates to avoid damage to the seats or faces. The practice of driving a blunt cold chisel between the seats to separate the parts may damage the seats. If the gasket is properly applied and the cylinder head studs well fitted, the head should lift off easily.

When replacing head or plates, be sure that all gaskets are in place and that all joints are tight. Care must be exercised to prevent dust or other foreign matter lodging between the gasket and seats. If the old gasket is damaged, a new one should be used, as attempting to use a gasket unfit for the purpose is poor economy. Clean used gaskets thoroughly before replacing them. Do not apply paint or other similar substance to the gasket that will cause it to stick to the seats, as this may cause damage in removing the head or plate. A well-fitted gasket does not require artificial means to secure a tight joint. The bolts must be tightened uniformly to avoid cramping and to insure a tight joint.

Carbon Removal

Carbon will form in cylinders, parts and fuel nozzles after long service or from improper lubrication. This is the principal reason for rings sticking in the piston with resultant loss of compression. Carbon will also form on the inside of the cylinder head, on the end of the piston, in the ports and around the valves of four-cycle engines. It may be removed by solvents and by scraping. Care must be used in removing carbon to avoid scoring or damaging finished surfaces.

The valves of four-cycle engines sometimes require regrinding to overcome leakage and loss of compression. The water service repairman should regrind the valves and seats with oil and flour emery or other acceptable grinding compound. Coarse emery should never be used as it will scratch and score the seat and valve.

Worn or loose connecting rod bearings are indicated by the engine knocking. They should be attended to promptly by taking them up or by renewing the bearings. Crank-shaft bearings are usually provided with

The Water Service Series

The nine articles in this series, published previously, include the following:

(1) Introduction (April, 1944)
(2) (3) (4) Sources of Supply (May, June & July, 1944)
(5) The Maintenance of Pumps—Reciprocating Pumps (Aug., 1944)
(6) The Maintenance of Pumps—Centrifugal Pumps (Sept., 1944)
(7) The Maintenance of Deep Well Pumps (Oct., 1944)
(8) Miscellaneous Pumps (Dec., 1944)
(9) Power Units — Part I (Jan., 1945)

shims to permit of making adjustments for wear. If the knock is in the piston end of the connecting rod, it can be corrected by replacing the piston pin or bushing, or both, if necessary. These bearings are the most important of all, and any neglect of them may result in the destruction of the engine. Care should be used to avoid making the bearing too tight, as the friction may burn it out.

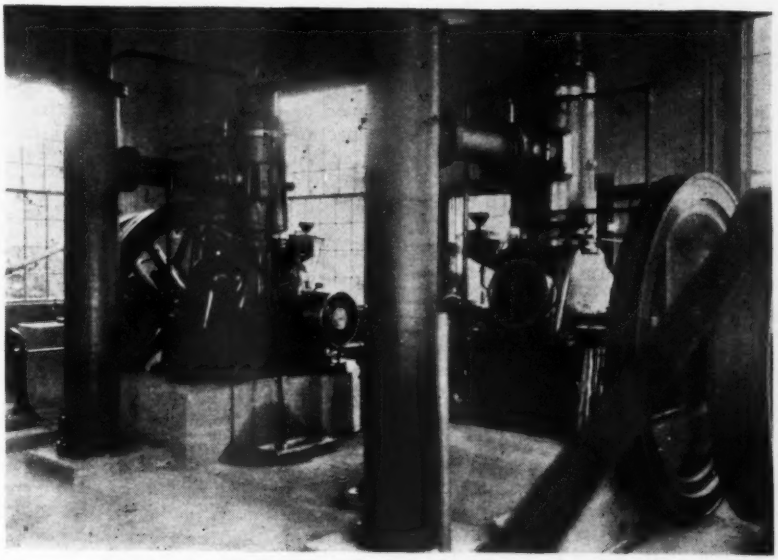
Safety

While an internal combustion engine does not present any great hazard in its operation, as with any other piece of machinery there are certain rules of procedure that must be followed by both the pumper and water service repairman in the interest of safety. The governors must be maintained in good operating condition to prevent the engine running away and wrecking itself. All are, or should be, familiar with the hazards connected with the handling of gasoline under conditions where it may be exposed to a spark or an open flame. The lower grade fuel oils used in the semi-Diesel and full-Diesel engines are less volatile than gasoline, and do not present the same hazard from fire, as far as the oil itself is concerned, but the gases or vapors from such oils are explosive. If these gases are allowed to accumulate in closed places they constitute a serious hazard. Every precaution should be followed to prevent their formation through leaks or waste in handling. In addition to the hazard from explosions, carelessness in handling creates a fire hazard.

Cleanliness is necessary to the satisfactory operation of all machinery. It is doubly important where inflammable oils are used. Fuel oils or gasoline should not be handled in buckets or other open containers if possible to avoid it. If oil of any kind is spilled, it should be disposed of promptly. Surplus oil should be wiped from the engine. Oil should not be allowed to stand in open containers, as it not only presents a fire hazard but is subject to contamination from dirt and other foreign matter.

Where air tanks are used for starting the engine, they should be inspected and maintained in the same manner as other pressure vessels. They should be tested under hydrostatic pressure at regular intervals, and should be provided with safety valves set to discharge at the safe working pressure. Under no circumstances should the pumper or other operator of the engine be allowed to tamper with the safety valve.

Approved guards or railing should be maintained around fly-wheels, belts and other moving parts. If the engine is started by means of a crank or by rocking the fly-wheel, the pumper or other operator should be fully instructed as to the proper method of procedure. The engine should not be operated at a speed in excess of that designated by the manufacturer, as shown on the name plate. The exhaust pipe, muffler and connections should be kept tight, as leaks within the pump or engine house will permit the escape into the house of the deadly carbon monoxide gas.



Oil Engines, Such as Those Shown in This View, Should Be Operated and Maintained by Experienced Employees

No attempt has been made to cover all of the innumerable details of the operation and maintenance of the many different types and kinds of internal combustion engines, as space will not permit this. Therefore, every pumper and water service repairman should be provided with a copy of operating instructions and parts list pertaining to each particular type and make of engine he is to operate or maintain. These can be obtained from the manufacturers upon request.

Steam Heads

A deep well steam head consists essentially of a vertical steam cylinder mounted on a frame and base plate, and is designed to be placed directly over the well. The base plate contains the packing box for the displacement plunger, which forms the connection between the steam piston and the pump rods. The base plate is so arranged that by removing all but one of the bolts from the bottom of the frame, the head can be swung around on the base plate to permit the pulling of the rods from the well.

The operation of the deep well steam head is practically the same as the cylinder of a direct-acting steam pump, the only difference being that the piston of the pump is connected to a string of pump rods instead of directly to the water piston of the pump. The methods to be followed in the maintenance of the steam head are the same as with any other steam cylinder. Particular attention should be given the valve trips on the valve rod actuating the steam valve to see that they are adjusted to the correct length of stroke.

The regulation of the choke valves on the valve chamber is also important. These valve chokes are designed to regulate the admission of steam to the cylinders, as less steam is required on the downward stroke than on the upward stroke because of the weight of the rods and the fact that the water is lifted on the upward stroke, while the throttle valve controls the speed of the pump. These choke valves must be adjusted by the water service repairman to meet local operating conditions, such as the pumping head and length of rods. They should not be tampered with by the pumper or used to control the speed of the pump, as the main throttle valve is designed for that purpose.

The steam head should not be allowed to rest on the well casing, but should be supported by a good firm foundation of concrete or concrete blocks under the base to eliminate vibration and the possibility of misalinement.

Wind mills consist essentially of sails or propellers, formed of wood or steel, radiating from a shaft and forming a wheel which is mounted on

a tower of the required height. The wheels are from 10 ft. to 30 ft. in diameter. The sails may be either fixed or movable and are set at the required angle with the plane of the wheel. The wheel is held in position facing the wind when in operation by means of a rectangular vane or rudder which is hinged in a vertical plane at the rear end of the shaft upon which the wheel is mounted. The rudder is designed to fold against the wheel when the mill is not in use. In some wheels the sails can be closed with the movement of the rudder, and the wheel swung edgewise to the wind.

Governors are provided, where required, to stop the mill when the tank is filled, or for necessary repairs and to prevent damage from high wind. The governors are both hand and automatic in operation. They should be kept in good operating condition at all times to prevent the mill wrecking itself in a gale or high wind.

The horsepower of wind mills will vary greatly according to the size of the wheel, its elevation and the velocity of the wind. According to tests made some years ago, a wind mill with a 10-ft. wheel will develop 0.12 hp. at a speed of from 60 to 65 r.p.m., while a 25-ft. wheel will develop 1.34 hp. at 30 to 35 r.p.m. A small wheel mounted on a high tower will provide more uniform power than a large wheel on a low tower.

Wind mills furnish an economical means of pumping under certain conditions as, for example, at stockyards and other stations where the demand for water is not great. They are not a reliable source of power, however, as they are wholly dependent upon the force of the wind for their operation. Therefore, an auxiliary source of power is necessary to maintain an uninterrupted supply of water.

As with other pumping equipment, wind mills require a certain amount of attendance and repairs. The towers should be maintained in good condition, as shaky, unstable towers cause poor operation and frequent repairs. On the other hand, an unbalanced wheel, largely because of missing sails or loose, poorly fitted pump connections, will cause vibrations that damage the tower. Adequate lubrication of the wind mill is important, as all moving parts are usually exposed to the weather. The more modern wind mills are equipped with grease cups, which provide better lubrication over longer periods between filling than the ordinary bearing with plain oil holes requiring the daily application of oil. The mills should be inspected at regular intervals and adjustments and repairs made promptly to avoid breakdowns.

N. & W. Makes Track Awards

FOLLOWING past practice, the Norfolk & Western completed its annual track inspection late in 1944 for the purpose of ascertaining the comparative track rating of divisions, roadmasters' territories and section foremen's territories on the different districts of the road. This time, however, the method of making the inspection was radically changed from that of other years, with the result that the records obtained provide no ready comparison with those of previous years. For the 1944 inspection, the N. & W. used the gyro inspection car owned by the Chesapeake & Ohio, and track ratings were established partly on the basis of recordings made by the car and partly by the visual inspection of roadmasters who accompanied the car, with the machine recordings contributing 70 per cent toward the total score and the visual inspection 30 per cent.

The gyro car was operated in a special train over the entire N. & W. main lines between Cincinnati, Ohio, and Columbus, to Norfolk, Va., and between Roanoke, Va., and Hagerstown, Md., a total distance of 1,770 track-miles, beginning at Cincinnati on November 21. Other lines were given a visual inspection only. Use of the recorder car also involved changing the value of the track ratings to a percentage basis. Formerly, the maximum rating given was 9.50, whereas, in 1944 the maximum was based on 100 points.

Among the company's divisions, the Norfolk division, with a rating of 96.86, held first place, while the Radford division, with a rating of 96.22 was second. Among the roadmasters' territories, District No. 2, on the Norfolk division, was first with a rating of 97.10, followed by District No. 3, on the same division, with a rating of 96.94.

In accordance with past practice, the road awarded cash prizes to the track foremen on the different districts whose territories ranked in first, second, third and fourth places on their respective districts, and, this year, an additional prize was given to the foreman earning the highest rating for Class B track. A total of 82 section foremen received such prizes, which included 21 first prizes, 24 second awards, 19 third place awards (including one for Class B track), and 18 fourth-place prizes.

Among the section foremen, five received ratings of 97.90 or better (which is approximately equivalent to 9.30 by the old rating system). These were: L. W. Morris, Disputanta, Va.; J. R. Jamerson, Prospect, Va.; H. B. Cralle, Evergreen, Va.; E. A. Tolley, Forest, Va.; and F. P. Combs, Rural Retreat, Va.

Flame Cleans and Oils Rails

(Continued from page 160)

ping unit has been built, which consists of a welded steel tank embodying two curved chutes constructed of channels and a grillage for draining off the excess oil.

The operation of salvaging joint bars, which is performed by a crew of eight men, involves six principal steps as follows:

(1) The first man transfers the bars from a pile to the conveyor rollers.

(2) The second man grinds the easement in each bar, which is about 1½ in. long by 1/16 in. deep.

(3) The third man
- (a) Inspects the top of each bar for cracks, and, if any are present, places the bar in a scrap pile;
- (b) Checks the top fishing surface with a 36-in. straight edge;
- (c) Checks the fishing height with a gage;
- (d) If bar is less than 1/32 in. concave and the draw in template is not 1/16 in. less than new, this man marks it No. 1 (such bars can be used with relayer rail in main track); and
- (e) Marks all other bars No. 2 (these can be used only in secondary tracks).

(4) The fourth man pushes the bars through the flame cleaning heads by hand at a speed of about 12 ft. per min.

(5) The fifth and sixth men brush the bars with hand wire brushes and place the No. 1 bars in the first chute to the dipping tank and the No. 2 bars in the second chute. The bars slide down the chutes into the oil tank by gravity, at the same time pushing the preceding bar up onto the drain board.

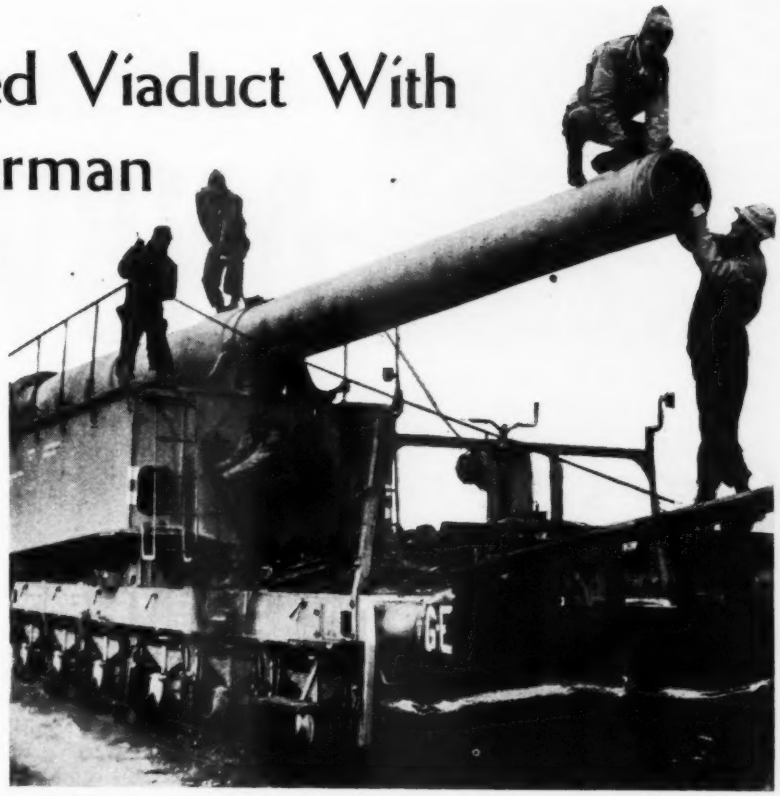
(6) The seventh and eighth men place the bars in piles where they can be picked up by a crane.

Using this equipment and procedure an average of about 1,000 bars can be treated in an 8-hr. day at a cost of about 6 per cent of that of new bars.

All phases of the work involved in developing the procedures described in this article have been under the general direction of W. P. Wiltsee, chief engineer, Norfolk & Western, and under the direct supervision of B. E. Crumpler, maintenance engineer, and R. P. Winton, welding engineer, all at Roanoke, Va.

Repair Bombed Viaduct With Captured German Gun Carriage

AN OUTSTANDING example of bold resourcefulness in solving a difficult bridge repair problem in a theater of war is portrayed by the three photographs reproduced on this page. The problem was the necessity of repairing a stone masonry viaduct on a vital railway line in France in which the arches of two adjoining spans had been demolished by the Germans. Known as the Pont de l'Arc bridge, the viaduct spans the Arc river, near Aix, France, and constitutes an important railroad communications link for the ports of Marseille, Toulon and other coastal towns. Since the repair of the viaduct in the conventional manner by using Bailey bridging would have required three weeks, this plan was discarded as entailing too much time. Our armed forces then conceived the idea of spanning the openings with the carriage of a captured German railroad gun, and these views show how they did it.



(Signal Corps photos)

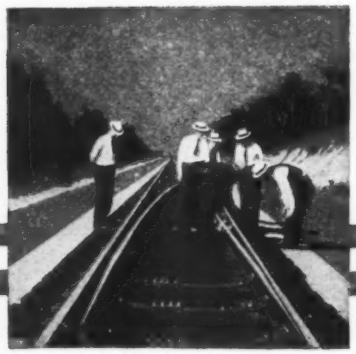
THE REPAIR WORK was performed by the 343rd Engineer Regiment. Since ordinary methods would have been too slow, they searched about for some way of expediting the work. The captured German railroad gun shown above provided the answer. It was discovered that the bed of the gun carriage, when stripped of the gun, its accessories, the trucks and other unnecessary parts, had the required dimensions and strength to span the gaps in the viaduct, and that it could be installed with relative ease and rapidity. The soldiers in the picture are at work dismantling the gun



HERE THE BED of the gun carriage is being moved into position to span the gaps in the viaduct. Apparently it is being drawn across the openings by lines extending to a pulling arrangement on the other side. The two vertical members at the left end of the span are motor-driven hydraulic jacks which formed part of the original equipment on the gun and which were used during the installation of the span. Similar jacks near the opposite end of the carriage are shown folded against the side



THIS PHOTOGRAPH shows the make-shift span in position. Note that the hydraulic jacks still remain attached to the carriage bed; also that the center pier under the span has been strongly braced by steel struts extending to adjacent parts of the viaduct. The ingenuity that conceived the unique method of repairing this viaduct paid handsome dividends in the form of time saved; as compared with the three weeks that would otherwise have been required, the job was done in four days



What's the ANSWER?

Collecting Scrap in Yards

What provisions should be made for picking up scrap in yards? During the winter? What immediate disposition should be made of it? Why? Does the size of the yard make any difference?

Comes From Three Sources

By G. S. Crites
Division Engineer, Baltimore & Ohio, Baltimore, Md.

The scrap that is generally found in yards falls for the most part into three categories, namely, track material, parts from cars, and car cleanings. Occasionally a piece from an engine may be found, but most often parts lost from engines are picked up immediately and taken to the shop with the engine.

The presence of scrap in yards speaks loudly of poorly-planned work on the part of the track forces. When old material is removed from the track it is as important to take it away as it is to get the new material to the job. In other words, the work is not done until the old material or scrap is gathered up and disposed of. When emergency track repairs are made in yards, it should be the responsibility of those making the repairs to see that the material displaced is removed.

Car scrap finds its way into yards in two ways; car repairmen making running repairs to cars may drop the parts removed in the yard, or parts from cars may simply drop off. It should be a simple matter for car repairmen to dispose of the parts that are removed from cars when repairs are made. If time does not permit the mechanic to dispose of such parts, some other person must be assigned to do this.

If cars are cleaned on yard tracks, the cleanings must be disposed of currently. Those cleaning cars should be provided with bags, boxes or other suitable receptacles in which to place the material picked up, and should be instructed to dispose of it at designated locations where the safety of yard employees is not involved. The size of the yard makes little difference in determining the policy governing the disposal of scrap. Both small and large yards should be free of scrap at all times.

Daily Pick-Up Desirable

By L. L. Adams
Assistant Chief Engineer, Louisville & Nashville, Louisville, Ky.

It is important that scrap in yards be picked up currently. Insofar as conditions will permit, all scrap released each day should be collected and taken to some storage point before the gang quits work in the evening. Scrap that is permitted to remain on the ground in yards where employees are constantly walking about creates a very definite hazard to safety. Also, if the scrap is left on the ground for any length of time it may be lost due to becoming covered. Suitable bins for receiving the scrap that is picked up each day should be placed at convenient points. Scrap so collected can be disposed of at convenient times.

The policy of picking up scrap in yards each day should apply throughout the entire year. The practice is even more desirable during the winter months when the possibility exists that the scrap might be covered with snow, thereby creating an even greater hazard. In my opinion, the size of the yard should not make any difference in determining the policy to be used in collecting scrap, as the hazard would be just as great in a small yard as in a large terminal

Send your answers to any of the questions to the What's the Answer Editor. He will welcome also any questions you wish to have discussed.

To Be Answered In April

1. *In view of the present shortage of labor, to what extent is the maintenance of a ballast toe line now warranted? How can it best be maintained?*
2. *In what ways can the life of built-up roofing be extended? What are the limitations on this class of work and as to when it should be done?*
3. *Where surfacing requires continuous use of tie tampers, should relief men be provided to "spell" the men operating the tampers? Why? How long should the rest periods be?*
4. *What are the effects of over-driving wood piles? Concrete piles? Steel piles? How can over-driving be detected?*
5. *Through what methods does the foreman attain his greatest success in teaching safety to his men? Why? In what ways do some foremen nullify their teaching?*
6. *What special precautions, if any, should be taken where water lines are laid under tracks? Why? Does the volume of traffic or the speed of trains make any difference?*
7. *Should the section foreman or the supervisor plan the work in a large yard? Why? What qualifications should a yard foreman possess?*
8. *What is the best method for removing paint from exterior building surfaces, preparatory to painting? Interior surfaces? What are the advantages? The disadvantages?*

Floors For Enginehouses

What is the most suitable floor for an enginehouse? What considerations are involved?

Feels Concrete Is Best

By A. T. Hawk
Engineer Architect, Chicago, Rock Island & Pacific, Chicago

Taking all factors into consideration, including first cost, maintenance, the quality of the floor surface for walking and trucking, and the ease of keeping it clean, my experience has been that a good concrete floor is by far the most suitable for enginehouses. Obviously, there are good and bad concrete floors. To insure a sound concrete floor, the foundation material on which it is laid must be given careful attention to preclude the possibility of settlement. This means that any filling material placed under the slab must be thoroughly compacted before the concrete is placed. The filling material should preferably consist of sand or gravel, and should not be placed in a frozen condition for the reason that such material will later shrink, possibly resulting in settlement of the slab.

When concrete floors are placed they should be pitched toward the engine pits in such a manner that water will not stand on them. If the top surface of the concrete is flush with the tops of the pit rails, grooves should be provided in the floor along the outside edges of the rails to accommodate worn engine driver treads. Usually a better method to accomplish the same end is to stop the concrete slightly short of the pit rail (this being done to facilitate future renewals of the rail) and to fill in the space with asphalt mastic or concrete, providing a groove to accommodate worn tires. Weep holes should be provided under the rail to keep the opening along the rail free from water. Concrete floors in enginehouses must be of sufficient thickness (generally six inches) and must be well compacted and trowelled in such a manner as to insure proper hardness.

Other types of floors have not, in general, given satisfactory service in enginehouses. Brick floors, if used, should be laid on a concrete base and are more expensive than concrete floors. Brick floors present a relatively rough surface for walking and trucking and are likely to retain dirt and grease. Eventually a brick will become loosened and will be followed by many others, even if they are held in position with cement grout.

Like brick floors, those made of wood block must be laid on a concrete base. Even if creosoted or otherwise treated, such floors, when dried out, are apt to absorb moisture, resulting in the blocks bulging out of position. Mastic floors must also be placed on concrete bases and are apt to cost more than concrete floors. It is questionable, moreover, whether such floors can withstand the severe conditions prevailing in enginehouses.

It All Depends

By A. L. Sparks
Architect, Missouri-Kansas-Texas, St. Louis, Mo.

The answer to the first part of the question is that it depends on what considerations are involved. Perhaps the considerations vary too much for different locations to permit a definite answer to be given.

Some enginehouses have been paved with brick laid on a sand cushion over hard tamped cinders; some have brick on a concrete base; others have creosote-treated wood blocks on a concrete base; some have asphalt mastic on a concrete base; and still others have plain concrete floors with or without hardened wearing surfaces. Those who have used the first mentioned type—brick on a sand cushion—will agree that it is not very satisfactory under any conditions because a true level surface cannot be maintained on which to operate wheeled equipment. Furthermore, it does not provide a stable base on which to set jack blocks and does not permit proper drainage.

The second type, brick on a concrete base, is more satisfactory and overcomes most of the objections mentioned above. However, it still presents a rather rough surface on which to handle equipment, and it does not dry as quickly as a smooth surface. Creosote-treated wood blocks, when properly laid over a concrete base, provide a splendid working surface, both for equipment and for workmen. This type is affected by water, but under conditions where water is not present it might prove to be the most suitable type. Not only will it withstand extreme punishment, but broken blocks are easily replaced.

An asphalt mastic floor on a solid concrete base overcomes all the objections mentioned above but is seriously affected by steam and hot water from the locomotive blowoff and washout system, and is softened by the oil that is drained and wasted from the numerous oil cups and containers on locomotives. This type of floor has been used successfully in the much-traveled areas around the backwalls of enginehouses and in machine shops where men stand for long periods of time.

Heavy concrete floors, properly drained so that water stands neither under nor on them, overcome all the objections mentioned except that they are more tiring for workmen to stand on than are the more resilient surfaces. Concrete is more easily cleaned than any other type of floor and provides an excellent trucking surface. It is the least expensive of any of the more suitable floors and is generally the most easily obtained. It is desirable that it be reinforced with heavy wire mesh or other reinforcing, but the other ingredients required are not rationed and require no priority assistance.

In looking over the requirements for enginehouse floors it may be found that the most suitable floor is one of concrete between the engine pits and at the locomotive engine doors, and one of the asphalt mastic or wood blocks on a concrete base for the back of the house and in those areas where bench or machine work is done.

Variety of Materials

By J. W. Hopkins
Principal Assistant Engineer, Bessemer & Lake Erie, Greenville, Pa.

Floors in enginehouses can be selected from a variety of materials, the usual practice being to use plank, wood blocks, concrete or a bituminous material, or a combination of them. Probably quite a number of enginehouses are floored with ashes or cinders, but for obvious reasons, such material should not be recommended for future installation.

The qualities desired in an enginehouse floor are high resistance to wear, abrasion and shock or impact; the ability to withstand repeated applications of hot water and oil or grease without deterioration, and without becoming slippery; and as much resilience as can be obtained for the comfort of workmen. To reduce reverberation as much as possible, a floor with a low sound-reflecting index is desirable. The ability to resist fire is also important. The first cost of a floor, while important in itself, should not be the controlling factor; in other words a floor that would best serve the purpose should be selected and will prove to be cheaper over a

period of years even though the first cost is higher.

The most suitable floor would seem to be the one which, when first installed, meets all of the requirements listed, has the ability to withstand hard wear and distortion due to heavy trucking and the repeated use of heavy tools and equipment, and which provides a non-slippery surface for workmen.

A floor made up of a bituminous wearing surface on a concrete slab on a prepared subgrade of suitable material will probably best meet all of the requirements. The bituminous surface may be of one or two-course construction and should be of a type that provides a granular surface. Fine-grained asphalt should not be used for the surface course.

A concrete floor without any added wearing surface will meet the requirements for wear and impact, and also for resistance to water and oil, but will tend to become slippery in the presence of grease, even with special finishing. Also, a concrete floor provides little if any resilience, is tiring to workmen, and has low sound absorbing qualities.

A wood floor made up of planks carried on timber sleepers or laid on concrete will be satisfactory when first laid but will require considerable maintenance. Heavy trucking will tend to cause excessive wear and splintering. Also, the wood surface will soon become slippery from grease and oil droppings.

From the standpoint of first cost, the various types of floors would probably range down from the most expensive as follows: (1) wood blocks on concrete; (2) plank on concrete; (3) a bituminous surface on concrete; (4) all concrete; (5) plank on sleepers; and (6) a bituminous surface on a prepared stone or gravel base. However, as already mentioned, the cost should not be the controlling factor, and probably the difference between the first three types listed would not be large enough to make it much of a factor.

Regarding bituminous surfaces, the writer has had the benefit of experience with, and observations of, a bituminous floor laid seven years ago, which consists of a two-course surface on compacted ashes and crushed stone. This floor has given very satisfactory service and will continue to do so, but undoubtedly would have been better if a concrete base slab had been placed to provide underlying structural strength to resist the wear and distortion due to heavy trucking.

Use and Care of Track Jacks

What precautions in the use and care of track jacks tend to increase their service life? To what extent do these precautions also affect safety?

Several Precautions

By W. Woolsey
Section Foreman, Illinois Central, Chicago

Like any other mechanical device with bearings, track jacks should be kept well lubricated. This not only lengthens the service life of the jacks but promotes safety and ease of operation as well. It is not uncommon to see two men operating a poorly-lubricated track jack when the same operation could be performed by one man if the jack was properly oiled. While the bearings of a track jack do not involve a rotating action, they are subject to extremely heavy loads, and for this reason it is necessary that they be kept adequately lubricated to insure proper performance.

A practice in the handling of jacks that should be discouraged is that of throwing them down carelessly when there is no use for them at the moment. For one thing, this practice shortens the service life of the jacks because it permits particles of dirt, cinders and other material to collect around the bearings, resulting in more rapid wear than if they were kept clean. Furthermore, particles of fouling material may also get into the notches of the rack, thereby preventing the pawls from engaging the rack snugly during operation of the jack. Under such conditions the pawl may slip out of position when the jack is under load, with possibly serious consequences to the operator.

Track jacks are frequently damaged as a result of being released improperly under the strain of a heavy load. Where two or three jacks are being used in a group on a heavy lift, care should be taken to insure that they will be released in unison; otherwise the entire load may be imposed on one of the jacks with unfavorable results.

Care in the selection of operators for track jacks is an important element in securing their maximum service life. It is important, of course, that the operator be thoroughly familiar with the use of jacks and the proper method of operating them. When the jack is placed in the track, it is his responsibility to remain with it until it has been safely removed. Moreover, the operator should never be permitted to place a jack between ties that are so close together that the base of the jack has to be forced or squeezed between the ties. If this should be done difficulty might be experienced in removing the jack to clear for a train.

Must Not Overload

By A. B. Chaney
District Engineer, Missouri Pacific, Little Rock, Ark.

The first requisite in the care and use of track jacks to insure maximum service life and safety in their use is never to overload them. To do so often results in breakage and failure under load. Proper lubrication is important. Also, it is advisable to avoid striking them heavy blows as such blows frequently result in damage to the parts. Wherever possible, jacks should be set vertically and on a level footing to minimize the possibility of their shifting or turning while under load.

Jacks should not be dropped on the rail or other tools, and when out of order should be repaired or replaced. Furthermore, jack bars should not fit too loosely. Although track jacks are among the most rugged of tools, reasonable care and protection will extend their service life and reduce the hazard of injuries being incurred incident to their use.

Four Things to Watch

By S. H. Shepley
Supervisor of Track, Elgin, Joliet & Eastern, Joliet, Ill.

While the track jack is a simple mechanism, there are a number of items of maintenance necessary for its efficient use. First, jacks should not be overloaded. All jacks have a rated capacity and, while they are designed to lift more than the stated figure, excessive overloads are bound to cause either distortion or breakage. It goes without saying that when a jack fails under excessive load a dangerous situation is created, and hence the overloading of jacks constitutes an unsafe practice.

Secondly, jacks should be oiled at regular intervals so that the pawls will operate properly on the rack. Proper oiling will also increase the service life of the trunion bearings, the pawl bearings and the rack bar. When the pawls become inoperative and do not properly engage the rack, there is a

possibility of the jack dropping the load and either straining or injuring the jack man or men.

The third item to be considered concerns the handling of track jacks when not in use. The usual requirement is that when jacks are not being used they should be laid down. While this is a sound safety measure, it is possible that in so doing the jacks may become clogged with cinders or dirt; hence, before a jack is used it should be cleaned so that the pawls will engage the rack bar properly.

The fourth item I have in mind deals with the choice of men for operating jacks. My opinion is that the prime requisite for the safe and efficient operation of a track jack is to have a man operating it who is thoroughly familiar with his work, who exercises the proper care when setting it into position, who observes carefully the movements of the men working with him, who removes the handle when the jack is not actually being used for lifting, and who employs the correct jack handle when lifting.

Seriousness of Nicks in Rails

To what extent are nicks serious when made by broken wheels on the heads of rails? On the bases? What action should be taken?

An Important Question

By C. B. Bronson
Inspecting Engineer, New York Central System, New York

This is an important question, especially in those cases where a wheel with a section of the rim and tread broken out runs several miles before being discovered. The damage in such instances varies between the rails, and even between the nicks on the same rail, due to the swaying action of the car. For example, one nick may be quite heavy and the next one or two may be much lighter, shallower, or less severe. Another reason for the variations in the types of nicks made by the same wheel is that when the tread is first broken the indentations usually are sharp and deep. The broken section then becomes rounded or smooth, with the result that the nicks formed by it are spread somewhat and are not as deep as those made originally.

The first thing that should be done as soon as the damage has been discovered is to place a slow order on the track involved. A careful examination of all the damaged rails should then be made to discover if any of them are partially broken, checked or cracked in the head. Sometimes the damage is greater in the base, where seams may be opened up and half moon breaks noted, or, in extreme cases, rails may be ruptured from the base upward.

If the individual nicks are sharp and deep—usually on the gage corners—the rails containing them should be removed. However, there are usually few rails in such condition as to require immediate removal. Many of the marks formed are long, irregular crescents, and when these become rusted they look rather bad. We have found, however, that if a slow order is maintained for several days, and the rails watched closely, the more ragged edges of the crescents or nicks become polished and look a great deal better. At the end of a few days a final detailed examination is made of all rails at the location, and a decision is made individually regarding each rail concerning whether it should be removed or left in the track. The best yardstick in coming to this decision is the judgment of a qualified man. However, any rails with deep and sharp reentrant nicks must be removed, or any that show the least sign of a check or crack at the point where the damage has been inflicted.

Where the bases of the rails have been nicked there is only one thing to do—remove them all. The only way that a wheel tread with a broken-out section can nick the base is when there has been a derailment. Nicks in the bases of rails are on the tension side directly under the wheels and are, therefore, subjected to the highest bending stresses and impact effect. Under no circumstances should a rail with a nicked base be left in track. Protecting them with splice bars (except as a temporary measure) is bad practice.

Power Tools For Steel Gangs

With what power tools should a bridge gang engaged in steel bridge maintenance be equipped? For what operations is there an unfilled need for power tools?

Requirements Listed

By A. E. Bechtelheimer
Engineer of Bridges, Chicago & North Western, Chicago

In order to work efficiently and safely, a steel-bridge crew engaged in maintenance work should be equipped with a rivet cutting gun, a rivet buster, a non-reversible drill, a non-reversible close-quarter drill, a reversible impact wrench, riveting hammers, a holder-on, a chipping hammer, a jack hammer, and a demolition tool. The rivet cutting gun, which is operated by two men, is used for cutting off rivet heads from the larger size rivets, and, by inserting a back-out bar, may be used for backing out rivets otherwise difficult to remove. The rivet buster, which is operated by one man, is used for cutting heads from the smaller rivets and for backing them out.

The reversible impact wrench, which is likewise operated by one man, is used for tightening and removing nuts on fitting-up bolts. It is also employed to remove nuts from bolts which otherwise could only be taken off by splitting or burning them with a torch. Chucks for the reversible impact wrench to fit square and hexagon nuts for various-sized bolts are carried with the outfit. Two sizes of riveting hammers should be used, one for driving the larger rivets and a lighter one for driving the smaller ones.

The holder-on is used for bucking up rivets where limited space prevents this from being done manually. The function of the chipping hammer is to clean off paint or rust from old steel, while the grinder is used for finishing purposes where perfect bearing is necessary. The jack hammer is used for drilling holes in masonry and concrete for the insertion of bearing anchor bolts and dowels, and the demolition tool is used for resurfacing old masonry or concrete to insure a good bearing.

In addition to the tools mentioned above, it is necessary to carry flame-cutting equipment, as well as such hand tools as wrenches, dolly bars, a forge, drift pins, fitting-up bolts, mauls, clamps, tongs, jacks, etc. Pneumatic tools driven by an air compressor hold preference for bridge maintenance work since electric power is seldom available.

A well-organized crew engaged in

bridge maintenance will consist of a foreman, at least four iron workers and a helper. It is necessary to have four iron workers since it requires four men to make up a riveting crew. The duties of the men in the riveting crew are as follows: One man for heating rivets; one to catch rivets and insert them in holes or to hand them to the bucker-upper for insertion; one for driving rivets; and one for bucking up the rivets with a dolly or holder-on.

Are Well Mechanized

By Supervisor of Structures

Because of the availability of pneumatic riveting hammers and related tools at an early date, steel bridge gangs were among the first railroad work crews to experience the benefits of power equipment. The mechanization of such gangs was especially rapid following the introduction of the portable gasoline-engine-driven air compressor, and the process has continued to date as new and improved types of tools have become available. Among the more recent additions to the power tools available for structural work is the pneumatic impact wrench, which is already considered indispensable by many bridge men.

The well equipped steel gang of today will have a wide variety of power tools for use in carrying out the many different tasks likely to be encountered. These tools include riveting guns; rivet busters; power wrenches, including at least one impact wrench; chipping guns; variable-speed air motors for operating grinders, brushes, drills and reamers; pneumatic bench grinders for dressing tools; demolition tools; stone hammer drills; air hoists; circular hand-held power saws; wood augers; an oxy-acetylene cutting outfit; hand-operated hoists of various capacities; an air compressor; and a motor car or auto truck.

If any considerable amount of painting is to be done, the equipment furnished the steel gang may well include a flame-cleaning outfit and a spray-painting unit. Also, in view of the increasing extent to which welding is being employed in repairing and reinforcing steel bridges, many bridge gangs are now equipped with portable arc-welding outfits.

In most instances the units of equipment mentioned above will be regularly assigned to the gang, although some of the larger units, or those used only infrequently, may be assigned only as needed. In the latter category are such machines as locomotive cranes and pile-driving equipment.

Referring to the latter part of the question, there are not many operations involved in the maintenance and repair of steel bridges that have not been mechanized. However, it is to be expected that new types of machines will be introduced from time to time, and that improvements will be made in existing types to increase their efficiency and effectiveness.

Thawing Out Water Lines

Under what conditions can electricity be used to thaw out water lines? How is it done? What are the advantages? The disadvantages? What precautions, if any, are necessary?

Is Usually Feasible

By E. M. Grime

Engineer of Water Service, Northern Pacific, St. Paul, Minn.

Electricity can usually be employed to advantage for thawing water mains located underground or in otherwise inaccessible places where the expense for removing or uncovering the pipe would be excessive. The method used is to raise the temperature of the pipe sufficiently above the freezing point to melt some of the ice adjacent to the interior of the pipe. A tap left open at the end of the frozen section allows water to escape as soon as a small area of the frozen section has been thawed, and the flowing water then quickly thaws the remaining ice.

The arrangement is simply to make the frozen section of the pipe part of an electric circuit. A good electrical connection is made on the pipe at a point just beyond the frozen section at one end, and a similar connection is made on a water tap or other suitable location at the opposite end of the section. Sufficient resistance to the flow of current through the pipe is built up to heat the metal. For use in thawing lines leading from water mains to individual houses, municipalities often provide themselves with small portable electric generating sets. The capacities of such sets may be 500 to 1,000 amp., and a field rheostat is provided to regulate the voltage. For ordinary small jobs best results seem to be obtained by using a current of 300 to 500 amp. and 10 to 32 volts. It is desirable to keep the voltage low to prevent possible injury to persons or damage to plumbing. Damage has sometimes resulted when an attempt was made to force current through pipe lines too rapidly at a high voltage. Reports indicate that a 1-in. connection 250 ft. long can be thawed in 15 to 20 min. using 300 amps, but that this will depend largely on the particular conditions encountered.

The author once had the problem of thawing a 6-in. pipe line about 1,500 ft. long. Arrangements were made to make connections with the frozen section at fire hydrants beyond each end and to install transformers to reduce the regular city current down to the voltage required. Working only at times when power requirements were less than the peak, about three days were required to open the line. The weather was extremely cold at the time, and the methods used not only saved considerable expense but relieved a serious water shortage. Such work should be undertaken only under the direction of an experienced electrical engineer.

Describes Simple Outfit

By Supervisor of Water Service

The use of electricity for thawing out pipe lines is adaptable to almost any conditions that may be encountered, and is used extensively by municipalities and to some extent by railroads. A primary requisite in using this method is to employ a high amperage and a low voltage. The power required may be obtained from either a central station or a portable generator.

A simple outfit for thawing water lines will consist of a suitable transformer, a barrel of water, two electrodes for a rheostat and a sufficient amount of heavy copper wire. Pipe-thawing outfits specially designed for this purpose are available and are comparatively simple to operate. Many public service companies maintain suitable equipment for thawing water lines by means of electricity, and in such cases the water companies have agreements with the public service companies to handle the work for them.

Portable equipment for thawing pipes consists of a gasoline-engine driven generator and other necessary appurtenances mounted on a truck or trailer. In this connection, electric-welding outfits are well adapted to use for thawing pipes.

There is no particular hazard in using electric thawing outfits except

where the current is taken from high tension lines, in which case it is advisable to have an experienced electrician in charge of the work. The primary advantage of thawing pipe electrically is that the process may apply to lines that are otherwise inaccessible.

The time required to thaw out a pipe line will depend on its size and length. While small pipe lines can be thawed in a comparatively short time, the larger lines may require hours and even days. The power required also varies with the size and length of the line.

In thawing a 6-in. line, 1,700 ft. long, laid in salt water, four 100-kw. transformers were used. The current was stepped down from 2,000 volts to 200 volts and ranged from 800 amp. at 200 volts to 1,800 amp. at 360 volts. A little more than five days was required to thaw out this line. However, this was an exceptional case, and under ordinary conditions much less time is required.

There are no particular disadvantages involved in thawing pipes by electricity. No precautions are necessary other than those that are commonly taken when using electric-welding outfits, except that where pipe lines are located in buildings, measures should be taken to preclude the possibility of causing a fire.

Ties From Abandoned Tracks

To what extent can ties released from abandoned tracks be re-used? Where? Should they be turned over? Why?

Depends on Conditions

By H. R. Clarke
Chief Engineer, Burlington Lines, Chicago

If tracks have been in service, as presumably they have, until the time of abandonment, tie renewals have necessarily been made to maintain the tracks in safe operating condition. Therefore, a percentage of the ties released by abandonment will undoubtedly be suitable for further service and should be re-used to prevent waste. In view of the prevailing scarcity of ties this is especially important at the present time.

The percentage of the ties that will be suitable for re-use depends, of course, on the standard to which the track has been maintained prior to abandonment. If the abandonment has been considered for some time, it is a general practice to reduce tie renewals and permit the tie condition to deteriorate as a means of avoiding unnecessary expense, both in renewing the ties and in salvaging them later when the line has been abandoned. As it is frequently uncertain when a line might be abandoned or how long its operation might be continued, it becomes a matter of judgment as to how far the tie condition can be permitted to deteriorate. It is certainly true that track must be maintained at all times in a safe condition for the service required.

It does not pay to salvage and re-use ties which have practically reached the end of their service life. As a general practice, to justify the salvage and re-use of a tie it is considered that a tie should be in condition to give at least five years' service when re-used. To obtain the maximum service and economy when salvaging ties, careful judgment should be exercised in choosing a location where they are to be inserted. As a rule they should be placed in a track of less importance (if this is possible) than the one released. It is, of course, desirable to install salvaged ties in tracks as close as possible to the point from which they are released. Also, they should be reinserted in track as quickly as possible after being removed from their original location, for a second-hand tie deteriorates more rapidly when it is not in service.

When salvaging ties for re-use, the spike holes should be carefully and properly plugged with treated tie plugs. If this is done it is not necessary to turn them over; in fact, in our opinion, it is preferable to place the ties in track with the same side up as originally, as we believe they will give longer service in this way. If the tie is turned over the former under side becomes the top side and is, therefore, exposed to the air, with the result that it deteriorates more rapidly than otherwise.

To A Considerable Extent

By Maurice N. Heath
Section Foreman, Boston & Maine, Lisbon, N.H.

Ties released from abandoned tracks can be re-used to a considerable extent. Nearly all treated ties released from such tracks will be found capable of further service in some form. Those ties that have been installed more recently may be found usable in the more important side tracks, while the older ties can be installed in yards or little-used side tracks. Even many untreated ties will be found capable of several years of additional service. In some instances such ties can be diverted for use as right-of-way posts. The use of old ties for this purpose is worthy of special consideration at this time in view of the prevailing shortage of steel posts.

When ties from abandoned tracks are re-inserted they should definitely not be turned over. The universal practice is to install ties with the heart side in the ground, thereby affording an opportunity for water to run off, instead of soaking into the wood. Obviously, if they are turned over, this effect is lost. Before re-inserting them, ties from abandoned tracks should have the spike holes plugged with treated plugs, and a dash of creosote should be applied to the spot after the plug has been trimmed off with a sharp adz. Any ties from abandoned track that are not suitable for re-use for any purpose should be placed in piles and burned in the same manner as during regular tie renewals.

Three Classes

By H. Wuerth
Division Engineer, Chicago, Chicago, Milwaukee, St. Paul & Pacific, Savanna, Ill.

In considering this question, the tracks from which the ties are salvaged should be divided into three classes, namely; (1) Main or trunk lines; (2) secondary main lines; and (3) yard and side tracks. When main or trunk lines are abandoned many good or usable ties are recovered. Usually the ties in such tracks are treated ties and it is not difficult to cull out the scrap from the usable by using a tie or timber bar. The usable ties are usually reclassified into two grades, "good" and "fair," the "good" ties being used in renewals in tracks of corresponding importance to those from which they were removed. The ties classified as "fair" can be inserted in passing or yard tracks where heavy power is operated.

With respect to ties removed from secondary main lines, the same practice can be followed, using those classified as good in the main track structure and those as fair in side or yard tracks. Similarly, when abandoning side or yard tracks, the salvaged ties should be re-used in similar trackage.

After ties have been marked for re-use they must be carefully inspected as to the condition of the plate bearing

area. It often happens that the tie plates seat themselves in the tie and that when such a tie is re-used with a smaller plate, as is often the case, a pocket is created along the edges of the plate. When these become filled with water and debris, their presence has the effect of shortening the life of the tie materially. For this reason salvaged ties should be adzed to eliminate these pockets. It is essential that salvaged ties be plugged before re-use and that any adzed surfaces be painted with creosote.

Under no circumstances should salvaged ties be turned over when reinserted. I am sure it is a general practice on most railroads to adze and bore ties with the sap side up; hence, if the tie were to be turned over the heart side would be up, with the result that rapid deterioration would occur. In addition, it frequently happens that ties that have been turned over break under the rail.

In conclusion, I would like to add that if great care is not taken when tracks are abandoned, many good ties will either be burned or used by neighboring farmers for fence posts. Many supervisors are not very enthusiastic regarding the re-use of second-hand ties. Personally, I feel that the money spent in inspecting and sorting the ties is fully justified by the added tie life secured.

Fire Protection at Pump Houses

What fire-protection equipment should be provided at pump houses where electric motors or internal-combustion engines are in service?

Depends on Type of Power

By J. L. Varker
Bridge and Building Supervisor, Delaware & Hudson, Carbondale, Pa.

At pump houses where electric motors are used, the best fire protection equipment is an extinguisher containing carbon tetrachloride. This type is a non-conductor of electricity and its contents do not have any harmful effects on the electric wiring. These qualities are particularly desirable when coping with fires in or around the motor itself. Another desirable feature of this type of extinguisher is its low freezing point which, on the average, is minus 40 deg. This is an essential quality if the extinguisher is to be used in a pump house that is not adequately heated at all times. Extinguishers of this type are usually furnished in comparatively small capacities, and for this reason it is advisable to have at least two of them readily available.

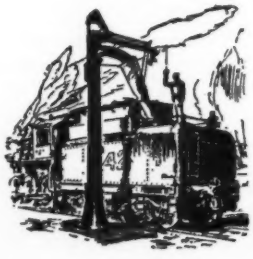
At pump houses where internal combustion engines are in use there exists a possibility of fires occurring involving oils, greases and fuel. Fires of this nature must be treated differently from those occurring where electricity is present. That is, they must be extinguished by smothering them. This is done by preventing oxygen from reaching the flames. A foam type of extinguisher will accomplish the desired results by throwing a blanket of foam over the fire area, whereas the use of water would scatter the oil and grease, thus spreading the fire. Dry sand may be used to smother a fire of this nature, although it is not as effective as a foam-type extinguisher. This is particularly true where a machine is involved, since a considerable portion of the sand may fall off, while the foam will cling to the parts.

All extinguishers should be inspected frequently and recharged periodically to be sure that they will be ready for use when needed. They should be inspected every six months at least, and recharged once a year. They should be located where they can be reached easily and quickly. Protection against possible damage should be provided. When extinguishers have been discharged, the proper authorities should be notified without delay so that recharging may be arranged for promptly.

Various Types Described

By Superintendent of Water Service

Fire extinguishers used in pump houses where electric motors are installed for operating pumps should employ a non-conducting extinguishing agent. Fire extinguishers of this type include: (1) Those that employ a vaporizing liquid with a tetrachloride base; (2) dry-chemical extinguishers, and (3) carbon-dioxide extinguishers.



Fire extinguishers using carbon tetrachloride are generally of the hand pump type. The sizes most suitable for use in pump houses are those having capacities of 1, 1¼, 1½ and 2 qts., although they are also available in 1, 2 and 3-gal. sizes. The liquid used in these extinguishers is a non-conductor of electricity, consisting of a carbon tetrachloride base with other components added to prevent freezing. They discharge a stream of liquid which is vaporized by heat and has a smothering effect on fire. They can be used with safety in coping with fires involving electrical equipment.

The material used in dry-chemical extinguishers is a treated bicarbonate of soda in a dry powdered form. This powder is discharged from the extinguisher by pressure produced by a carbon-dioxide cartridge. This type of extinguisher has a capacity of 10 to 20 lb. of the dry chemical.

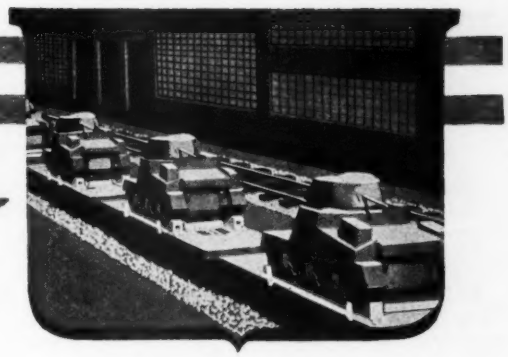
The carbon-dioxide extinguisher, as the name would imply, employs carbon dioxide as the extinguishing agent. Hand extinguishers of this type suitable for use in the ordinary pump houses are made in sizes containing 2, 4, 7½ and 10 lb. of carbon dioxide in liquid form under pressure. The chemical is discharged through a cone-like nozzle in the form of carbon dioxide gas "snow," and like carbon tetrachloride, is a non-conductor of electricity.

The extinguishers described above may also be employed where equipment in the pump house includes internal-combustion engines. In addition, foam extinguishers and loaded-stream extinguishers may also be used at such locations. Foam extinguishers are available in several sizes, although those most suitable for pump-house use are the sizes having capacities of 1¼ and 1½ gal. The chemicals used are solutions of bicarbonate of soda and a foam stabilizing agent in one chamber and a solution of aluminum sulphate in the other. When the extinguisher is inverted, the two solutions are mixed and discharged through a hose in the form of foam.

The loaded-stream type of fire extinguisher is available in sizes ranging from 1 gal. to 2½ gal. The solution in these extinguishers contain alkali metal salts and is discharged either by chemical reaction or by a carbon-dioxide cartridge.

Pails filled with dry clean sand are useful for extinguishing oil or gasoline fires but they are generally effective only in coping with small fires to prevent the spread of the flames.

NEWS of the Month



Conventions Banned

As a means of relieving transportation and hotel facilities, the war committee on conventions has ordered that, effective February 1, all conventions, conferences, trade shows and group meetings of more than 50 people are prohibited unless it can be clearly shown that failure to hold such meetings will have an adverse effect on the war effort.

O.D.T. Orders Railroads Drop Poorly Patronized Trains

The Office of Defense Transportation, on January 11, issued General Order O.D.T. 47, requiring railroads "immediately to discontinue all passenger train schedules which are operated for the purpose of providing seasonal service to any resort, recreational or vacation area," and, effective March 1, prohibiting railroads, except with O.D.T. permission, from operating a passenger train schedule on which the occupancy of seats and space did not average 35 per cent during the month of November, 1944. The order, which was designed to conserve coal, does not apply to mixed-train, suburban, or interurban service.

Highest Honors Awarded Military Railway Units

The highest honor to be given service troops by the War Department—the Meritorious Unit Service Plaque—has been awarded Headquarters and Headquarters Company of the 2nd Military Railway Service, a release from the European Theater of Operations announces. Maj. Gen. Clarence L. Burpee is commanding general of the 2nd M.R.S.

Following a landing on the Continent in July of last year, the personnel of this unit made reconnaissance of the railway lines in liberated territory and supervised operating and repair battalions in rehabilitating railway lines, shops and rolling stock.

Railroads "Critical" In Manpower Classification

The War Manpower Commission, on January 16, made public a list of "essential" and "critical" activities to be used by Selective Service as a guide in the induction of men in the 26 through 29 age group. Included among the "critical" activities are line-haul railroads; switching and terminal railroads; railway and air express; rail inspection; and maintenance and repair of railroad equipment, right-of-way and rolling stock. "Necessary" activities cover such transportation services as maintenance and repair of railroad buildings; local transit; rapid transit; and interurban electric railways.

Meanwhile, the Railroad Retirement Board has reported that, as of December 1, reports from approximately 85 per cent of the Class I railroads indicated manpower needs of 90,949, compared with reported needs of 90,000 on November 1.

Authorize Price Increases on Rail and Other Steel Products

Interim increases of $2 to $5 per ton in the ceiling prices at the mill level for five basic steel products were authorized by the O.P.A. effective January 11. Increases of $3 per gross ton were allowed on all types and grades of rail; of ten cents per 100 lb. on hot rolled carbon plates and hot rolled carbon sheets; of 15 cents per 100 lb. on galvanized sheets, roofing and siding; and of 25 cents per 100 lb. on nails and staples, other than galvanized.

Under the newly authorized increases, eastern basing point ceiling prices become $40 per gross ton, f.o.b. mill, for rails, $2.10 per 100 lb. for hot rolled carbon plates and sheets, $3.50 per 100 lb. for galvanized sheets, and $2.55 per 100 lb. for nails and staples. The increases may be applied to Gulf and Pacific coast prices in the same way.

In authorizing the increased prices the O.P.A. said that increases have been made on an "interim" basis pending completion of industry-wide cost studies now being made, which are expected to result in increases in prices on other iron and steel articles and "final adjustment" on the five products temporarily increased.

A.A.R. Embargoes Northeast

The Car Service Division of the Association of American Railroads placed in effect on January 23, a general embargo on freight consigned to points east of the line formed by Lake Michigan, the Alton Railroad from Chicago to East St. Louis, Ill., and the Mississippi river to Cairo, Ill., and north of the Ohio river to Huntington, W. Va., thence along the Chesapeake & Ohio to Hampton Roads, Va. The embargo covered all carload and L.C.L. freight except coal and coke, livestock, freight for ports of export, products in tank cars, and freight consigned to the Army or Navy or moving on government bills of lading. On January 26, it was announced that the embargo, which had been scheduled to expire January 28, would be extended until 12:01 a.m., January 30, and would cover all commodities except those consigned to the ports for export, or to ordnance plants, or government freight. The embargo was made necessary by congestion resulting from severe weather combined with shortages of locomotives and men.

Robins Named Director of W.P.B. Equipment Division

F. B. Robins has been appointed director of the Transportation Equipment Division of the War Production Board, succeeding George M. Cornell. Mr. Robins was born September 17, 1900, at Richmond, Va., and was graduated from Massachusetts Institute of Technology in December, 1923, with a B.S. degree. The following month he entered railroad service with the Chesapeake & Ohio, being assigned to the chief engineer's office. He remained there until 1927 when he went to the New York Central for a year's service in the office of the principal assistant engineer at Cleveland, Ohio.

In 1928, Mr. Robins returned to the C. & O. chief engineer's office, and in 1932 he was transferred to that road's maintenance of way department as assistant general supervisor of bridges and buildings. He remained in that position until he came to Washington, D.C., in November, 1941, joining the staff of the Automotive, Transportation, and Farm Equipment Branch of the Office of Production Management, predecessor to the W.P.B.'s Transportation Equipment Division.

When the latter was set up, Mr. Robins continued with it until June, 1943, when he joined the Association of American Railroads' staff as a technical analyst. He returned to W.P.B. in August, 1944, as a staff member of the Transportation Equipment Committee, Combined Production and Resources Board. A month later he joined the Office of Defense Transportation staff as assistant director of the Division of Materials and Equipment, the position he was holding at the time of his recent appointment.

Changes in Railway Personnel

General

Leonard C. Ayers, assistant general manager of the Norfolk & Western, at Roanoke, Va., and an engineer by training and experience, has retired.

T. P. Lynch, special engineer on the New York Central at Chicago, has been appointed tie and timber agent of the New York Central System, with headquarters at New York.

Frank Stearns Austin, purchasing agent of the New York Central, and an engineer by training and experience, has been promoted to general purchasing agent of the New York Central System, with headquarters as before at New York.

Buford W. Tyler, Jr., division engineer of the Maryland division of the Pennsylvania at Baltimore, Md., has been promoted to superintendent of the Renovo division, with headquarters at Erie, Pa.

A. J. Greenough, division engineer of the Pittsburgh division of the Pennsylvania, with headquarters at Pittsburgh, Pa., has been promoted to superintendent of the Wilkes-Barre division, with headquarters at Sunbury, Pa.

Mr. Greenough succeeds **P. M. Roeper,** an engineer by training and experience, who has been advanced to superintendent of freight transportation of the Eastern region, with headquarters at Philadelphia, Pa.

J. L. Cranwell, superintendent of the Philadelphia Terminal division of the Pennsylvania, has been promoted to general superintendent of the Lakes division, with headquarters at Cleveland, Ohio, succeeding **Paul E. Feucht,** who has been advanced to general manager of the Western region, at Chicago, in place of **Harry L. Nancarrow.** Mr. Nancarrow has been transferred to the Eastern region, at Philadelphia, succeeding **W. C. Higginbottom,** who has been advanced to asistant vice-president, with headquarters as before at Philadelphia. Each of these men is an engineer by training and experience.

H. Gordon O'Leary, whose recent retirement as superintendent of the Lakehead division of the Canadian National was reported in the January issue, was born at Lindsay, Ont., on November 4, 1878, and received his higher education at the University of Toronto. He entered railway service in September, 1904, as a rodman on the Transcontinental Railway, now a part of the Canadian National, and in 1906 went with the Grand Trunk Pacific, now Canadian National, as a construction instrumentman, later serving as resident engineer and division engineer on the Grand Trunk Pacific and the Transcontinental. In 1916, Mr. O'Leary entered the operating department of the Canadian Government Railway as a switchman, advancing to roadmaster, bridge and building master, division engineer and superintendent with that company and its successor, the Canadian National.

Engineering

E. M. Gleason, Jr. has been appointed chief engineer of the Alabama, Tennessee & Northern, with headquarters at Mobile, Ala.

L. A. Comeau, assistant engineer on the Canadian Pacific at Toronto, Ont., has been transferred to North Bay, Ont.

L. W. Lang, an instrumentman, has been promoted to assistant division engineer of the Memphis terminal division of the Illinois Central, with headquarters at Memphis, Tenn.

W. P. Sullivan, assistant to the chief engineer of the Chicago, Indianapolis & Louisville, has been promoted to chief engineering assistant, land and tax agent, with headquarters as before at Lafayette, Ind.

Alfred H. Visintainer, whose promotion to assistant engineer of structures of the Erie at Cleveland, Ohio, was reported in the January issue, was born at Mount Carmel, Pa., on October 11, 1903, and graduated in civil engineering from Lehigh University in 1926, immediately following which he entered railway service



Alfred H. Visintainer

in the engineering department of the Erie on construction work at Youngstown, Ohio. On July 1, 1929, he was advanced to inspector, and on January 1, 1939, he was promoted to construction inspector, advancing to assistant engineer in the department of structures on February 1, 1943.

Benjamin Chappell, whose promotion to division engineer of the Portage-Brandon division of the Canadian National was reported in the January issue, was born on June 8, 1903, at Port Arthur, Ont., and, in 1927, was graduated in civil engineering from the University of Saskatchewan. Mr. Chappell entered railway service as a chainman on the Canadian National in 1923, working summer vacations in a similar capacity until 1927, when he became a draftsman in the office



Benjamin Chappell

of the division engineer at Regina, Sask. After serving in various other positions, he was promoted on February 15, 1940, to assistant engineer in the district engineer's office at Saskatoon, Sask., remaining in that position until his recent promotion.

F. L. Lloyd, assistant division engineer of the Winnipeg terminal division of the Canadian National, has been promoted to division engineer of the same division, with headquarters at Winnipeg, Man.

G. C. Vaughn, track supervisor on the Maryland division of the Pennsylvania, has been promoted to assistant division engineer of that division, succeeding **W. G. Pfohl,** who has been advanced to division engineer, with headquarters as before at Baltimore, Md., replacing **Buford W. Tyler, Jr.,** whose promotion to superintendent of the Renovo division is reported elsewhere in these columns.

T. J. Murray, assistant division engineer of the New York division of the Pennsylvania, at Jersey City, N.J., has been promoted to division engineer of the Conemaugh division, with headquarters at Pittsburgh, Pa. Mr. Murray succeeds **W. G. Dorwart** who has been transferred to the Pittsburgh division, with the same headquarters, relieving **A. J. Greenough,** whose promotion to superintendent of the Wilkes-Barre division is reported elsewhere in these columns. **H. S. Unangst,** supervisor of track on the Maryland division at Baltimore, Md., has been advanced to assistant division engineer of the New York division at Jersey City, succeeding Mr. Murray.

Robert William Ross, whose promotion to engineer maintenance of way of the Western region of the Canadian National was reported in the January issue, was born at Walton, Ont., on May 12, 1885, and entered railway service in 1904, as a rodman on the Grand Trunk Pacific (now Canadian National) at Winnipeg, Man. After serving as instrumentman

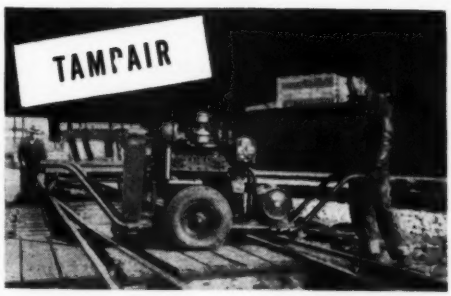
(Continued on page 176)

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and transitman on location and construction at Winnipeg, he was promoted, in 1910, to resident engineer, construction, with the same headquarters. From 1913 to 1918, he was employed as resident engineer, maintenance, with headquarters at Melville, Sask., and in the latter year was advanced to assistant engineer, maintenance, at Edmonton, Alt. In 1920, Mr. Ross was promoted to division engineer on the Canadian National at Edmonton, and in 1943 he was further advanced to district engineer at Winnipeg, remaining in that position until his recent promotion.

George W. H. Perley, whose retirement as division engineer on the Canadian National at Campbellton, N.B., was reported in the January issue, was born at Andover, N.B., on September 12, 1880, and received his higher education at the University of New Brunswick. Mr. Perley entered railway service in 1904 as a chainman on the Canadian Pacific, serving in various minor capacities until 1910, when he was appointed a diversion engineer in the irrigation department. In 1914 he went with the Canadian National as a concrete inspector, serving until 1915, when he entered military service with the Canadian Army. Mr. Perley returned to the Canadian National in 1919 as a transitman, and in 1920 he was promoted to division engineer at New Glasgow, N.S. In May, 1927, he was transferred to Campbellton, remaining in that position until his recent retirement.

Track

Rowan Grant, building inspector on the Canadian Pacific at Moose Jaw, Sask., has been promoted to roadmaster at Lanigan, Sask.

C. P. Richmond, assistant supervisor of track on the New York, New Haven & Hartford at Providence, R.I., has been transferred to New London, Conn.

A. B. Harrison, assistant trainmaster on the Chicago, Rock Island & Pacific, has been promoted to roadmaster, with headquarters at Holdenville, Okla.

E. C. Pirtle, general track foreman on the Memphis terminal division of the Illinois Central, has been promoted to supervisor of track on that division, with headquarters as before at Memphis, Tenn.

A. H. Tolbert, a transitman on the Atchison, Topeka & Santa Fe, has been promoted to roadmaster at Las Vegas, N.M., succeeding **E. L. Snyder,** who has been transferred to Albuquerque, N.M., replacing **Alonzo Stewart,** who has retired.

W. H. Wagner, acting roadmaster on the Chicago & North Western, has been promoted to roadmaster at Fremont, Neb., succeeding **M. C. Ericson,** who has been transferred to Iron Mountain, Mich., in place of **C. A. Saxon,** who has retired.

C. V. Zeiss, assistant roadmaster on the Chicago, Burlington & Quincy, has been advanced to roadmaster at Gillette, Wyo., replacing **M. Irelan,** who has been transferred to Oxford, Neb., succeeding **H. C. Arnold,** who has been transferred to Denver, Colo., in place of **W. M. Stevens,** whose death is reported elsewhere in these columns.

M. Cusack, acting roadmaster on the Nashwaak subdivision of the Canadian National, has been advanced to roadmaster on the Harcourt subdivision.

William David Keays, roadmaster on the Canadian National at Newcastle, N.B., has retired.

J. E. Lutes, section foreman on the Canadian National at Campbellton, N.B., has been promoted to roadmaster of the Nashwaak subdivision.

George C. Reich, general foreman in the bridge and building department of the Lehigh Valley at Jersey City, N.J., has been promoted to supervisor of track at Wilkes-Barre, Pa., succeeding **J. A. Maughan,** who has been granted a leave of absence because of illness.

W. C. Burke, general foreman on the Lehigh Valley at Easton, Pa., has been promoted to supervisor of track at Towanda, Pa., succeeding **A. J. Murphy,** who has been transferred to Sayre, Pa., replacing **D. Oakes,** whose death is reported elsewhere in these columns.

W. E. Frazier, whose retirement as supervisor of track on the Alton, with headquarters at Springfield, Ill., was reported in the January issue, entered railway service August 31, 1893, as a section laborer for the Big Four, advancing to section foreman on February 1, 1895. On January 1, 1906, he went with the Chicago & Alton (now Alton) as a section foreman, remaining in that capacity until April, 1915, when he was advanced to supervisor of track.

John W. Cates, whose promotion to roadmaster on the Missouri & Arkansas, was reported in the January issue, with headquarters at Leslie, Ark., was born at Clinton, Ark., on August 30, 1899, and entered railway service on the Missouri & Arkansas on May 10, 1916, working as a track laborer and later as section foreman. Except for the year 1927 and 1928, when he was employed by the Missouri Pacific, Mr. Cates' entire railroad career has been with the Missouri & Arkansas.

J. R. Hopper, assistant supervisor of track on the New Orleans & Northeastern, a part of the Southern Railway system, at Picayune, Miss., has been promoted to supervisor of track on the Alabama Great Southern, also a part of the Southern system, at Attalla, Ala., succeeding **S. B. Hinton, Sr.,** who has retired.

Mr. Hopper was born at Duncanville, Ala., on July 24, 1906, and was educated in the public schools of Hale county, Alabama. He entered railway service as a sectionman with the Alabama Great Southern on July 1, 1927. After serving as a sectionman and section foreman, he was advanced to assistant track supervisor on the New Orleans & Northeastern on August 16, 1944, holding this position until his promotion to supervisor.

J. V. Adams, assistant track supervisor on the Erie and Astabula division of the Pennsylvania, has been transferred to the Philadelphia Terminal division, succeeding **I. C. Golab,** who has been promoted to branch line supervisor of track at Trenton, N.J., replacing **J. J. Maher,** who has been advanced to main line supervisor of track at Baltimore, Md., relieving **D. W. Force,** who has resigned.

R. E. Gorsuch, assistant supervisor of track on the Philadelphia division of the Pennsylvania, has been transferred to the Middle division, succeeding **W. M. McCracken,** who has been promoted to supervisor on the Renovo division, with headquarters at Erie, Pa., in place of **L. L. Harding, Jr.,** who has been transferred to the Maryland division at Wilmington, Del., replacing **G. C. Vaughan,** whose promotion to assistant division engineer on the Maryland division is reported elsewhere in these columns.

F. D. Middleton, assistant supervisor in the office of the chief engineer of the Pennsylvania at Philadelphia, Pa., has been promoted to assistant supervisor of track on the Panhandle division, succeeding **M. H. McCully,** who has been advanced to supervisor of track on the Buffalo division, replacing **J. A. Zullinger,** who has been transferred to Akron, Ohio, on the Cleveland division, relieving **A. S. Barr.** Mr. Barr has been transferred to the Columbus division at Piqua, Ohio, succeeding **P. S. Settle,** who has been transferred to Perryville, Md., on the Maryland division, replacing **H. S. Unangst,** whose promotion to assistant division engineer of the New York division, at Jersey City, N.J., is reported elsewhere in these columns.

Bridge and Building

I. H. McClure, bridge and building master on the Canadian National at Moncton, N.B., has retired.

Special

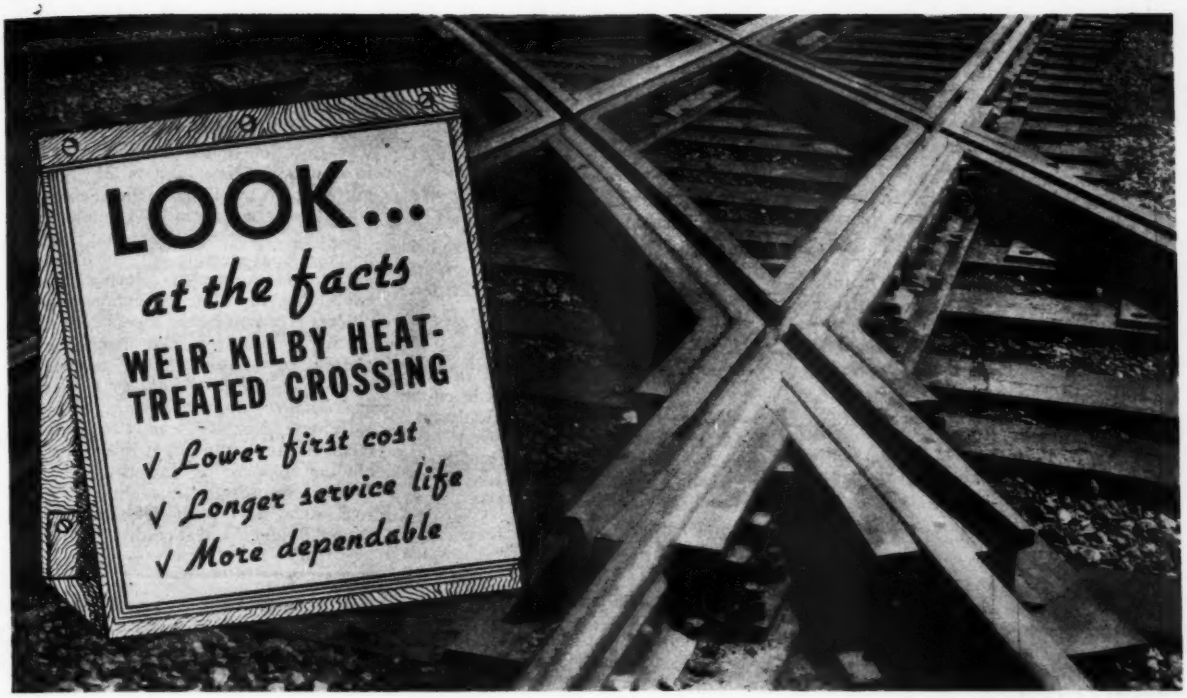
Herbert F. Moore, research professor of engineering materials, University of Illinois, Urbana, Ill., has retired from active service on the faculty of the University. Professor Moore has long collaborated with the Engineering division of the Association of American Railroads in its rail research, directing the Transverse Fissure Investigation conducted by the Engineering Experiment Station of the University in co-operation with the A.A.R. and the Rail Manufacturers' Technical Committee.

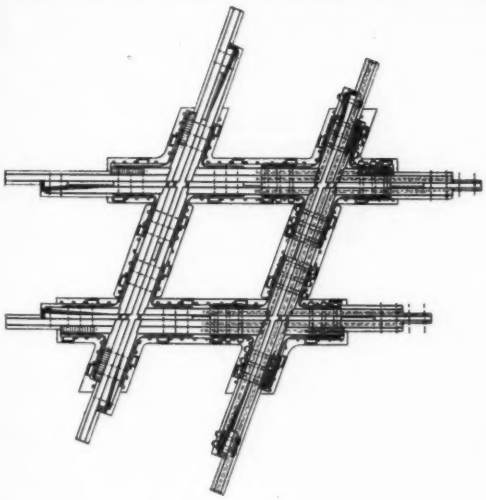
General administration of the Rails Investigation in the future will be handled by Professor F. B. Seely, head of the department of Theoretical and Applied Mechanics of the University. R. E. Cramer, N. J. Alleman and R. S. Jensen will, as in the past, continue to conduct much of the actual technical work.

Obituary

D. Oakes, supervisor of track on the Lehigh Valley at Sayre, Pa., died on December 27, 1944.

(Continued on page 178)





CATALOG "H"



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Joseph Weidel, who retired in January, 1943, as valuation engineer of the Atchison, Topeka & Santa Fe system, with headquarters at Chicago, died at National City, Cal., on January 6.

Martin W. Stevens, roadmaster on the Chicago, Burlington & Quincy at Denver, Colo., died on December 31. Mr. Stevens was born at La Platte, Neb., on February 28, 1894, and entered railway service on August 29, 1913, as a sectionman on the Burlington at Plattsmouth, Neb. On January 2, 1919, after serving as both a trackman and bridge and building laborer, he was promoted to section foreman at Omaha, Neb., being further advanced to general yard foreman at Denver, Colo., on February 2, 1925. Mr. Stevens was promoted to roadmaster at McCook, Neb., on August 1, 1932. In 1942 he was transferred to Denver, remaining at that location until his death.

Association News

Maintenance of Way Club of Chicago

The January meeting of the club, with 187 members and guests in attendance, was held on January 22 in the Ambassador room of Huyler's Restaurant, Chicago. The feature of the meeting was a two-part program on Rail Damage and Prevention, which was entered into by A. A. Miller, chief engineer maintenance of way and structures, Missouri Pacific Lines, St. Louis, Mo., and G. M. Magee, research engineer, Association of American Railroads, Chicago. In his address, Mr. Miller gave particular attention to the control of damage to rail in the field, and stressed the importance of proper supervision of the track forces to insure that such damage is held to a minimum. Following Mr. Miller, Mr. Magee, with accompanying stereopticon slides, discussed in some detail the recent tests conducted by the A.A.R. under his direction, at Northwestern University, to determine the effect of spike maul blows on the webs of rails at cold temperatures. The substance of Mr. Magee's remarks was presented in an article in the December, 1944, issue of *Railway Engineering and Maintenance*, page 1135.

The next meeting of the Club will be held at the usual place, 310 S. Michigan Avenue, on February 26, with a program which will embrace three speakers from the Chicago, Burlington & Quincy, who will discuss co-operation among the track, bridge and signal forces. The three speakers will be E. J. Brown, engineer of track; A. L. Essman, principal assistant signal engineer; and R. E. Sheehan, supervisor of bridges, system.

Bridge and Building Association

The new secretary of the association, Miss Elsie LaChance, is now established in the new offices of the association, 431 S. Dearborn St., Chicago, and is conducting an aggressive campaign in conjunction with the officers for new members and the collection of current dues. The committee appointed to complete the personnel of technical committees to make studies during the current year has practically completed its work, and it is hoped that a complete list of committee personnel can be announced shortly.

Metropolitan Maintenance of Way Club

The next meeting of the club will be held at the Governor Clinton Hotel, New York, on February 8. At this meeting Frederic E. Lyford, assistant to chairman of the board, Merritt, Chapman & Scott Corporation, New York (formerly trustee of the New York Ontario & Western), will discuss "Maintenance of Way Problems on the Portuguese African Colonial Railways." Mr. Lyford will speak from first hand knowledge, since he has only recently returned from a government mission to Africa.

Roadmasters' Association

The work of selecting the chairmen and members of technical committees to carry on the studies of the association during the current year has been practically completed and chairmen and members of these committees will be notified shortly so that active committee work can get under way. The new secretary of the association, Miss Elise LaChance is now well established in the new offices of the association, Room 901, 431 S. Dearborn St., Chicago, and all communications should be addressed to the association at that address. Plans for an annual meeting in September are being held in abeyance, but a meeting of the Executive committee is being planned in Chicago on April 7.

American Railway Engineering Association

Plans for the annual meeting of the association, which was scheduled to be held in Chicago on March 13-15, have been canceled, this action having been taken in view of the present situation confronting the railroads and hotels of the country, and in compliance with a letter issued by C. H. Buford, vice-president, operations and maintenance department, Association of American Railroads, requesting the various divisions and sections of the A.A.R. to cancel any plans that may have been made for annual meetings in 1945.

In lieu of the annual meeting, the Board of Direction will hold a meeting on March 14, to which both the outgoing and incoming officers will be invited. Preliminary to this meeting, a special committee of the Board will review the committee reports in preparation for submitting to the membership by letter ballot any proposals for changes in the Manual. The reports and letter-ballot decisions, together with such written discussions of the reports as may have been received, will then be published in the proceedings of the association for distribution to members as in past years. In lieu of the president's address which would normally be made if an annual meeting were held, President F. R. Layng will review at length the activities of the association during the year in the March (Year Book) bulletin of the association, which will also include the annual report of Secretary W. S. Lacher.

The only standing committee of the association to hold a meeting in January was the Committee on Economics of Railway Location and Operation, which met in Louisville, Ky., January 24. No committees plan meetings during February.

Following a plan to hold an election of officers, in spite of the fact that there will be no annual meeting, letter ballots were submitted to members during January, containing the slate of nominations for officers prepared by the association's nominating committee. The names on this slate of nominations were published in the January issue of *Railway Engineering and Maintenance*, page 78.

Bulletin No. 450 was also mailed to members during January, this bulletin including reports of the committees on Impact, Records and Accounts, Co-Operative Relations With Universities, and Wood Bridges and Trestles.

Supply Trade News

General

The **Mall Tool Company, Chicago,** has been given its fourth Army-Navy "E" award for continued maintenance of high production standards in the manufacture of war materials.

In recognition of its production record in the manufacture of power cranes and shovels for the armed forces, the **Thew Shovel Company,** Lorain, Ohio, has been presented with the Army-Navy "E" production award.

The **Lorain Castings Company,** Lorain, Ohio, has dissolved as a corporation and its assets have been taken over by the **Thew Shovel Company,** also of Lorain, as sole stockholder. The facilities of the castings company will be utilized by the Thew Shovel Company for production of its regular line of products.

Personal

Jose Maria Fierro, representative of the Blackmer Pump Company, Grand Rapids, Mich., in Mexico, D. F., and the adjoining districts, has been appointed general representative in the Republic of Mexico.

Cloyd W. Richards, service publications editor of **R. G. Le Tourneau, Inc.,** Peoria, Ill., has been promoted to assistant service manager. **Sam E, Beebe,** who has been eastern service manager since 1937, has been advanced to manager of service engineers.

James A. Greer has been elected vice-president of **The Rail Joint Company.** Mr. Greer joined the company in 1903 and, after serving in various capacities, was transferred to San Francisco, Calif., in 1915. He has been in charge of the San Francisco office since that time and

(Continued on page 180)

RAILWAY WEEDS

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The Bysulox Method of railway weed control combines the latest advances in the science of chemical weed killing with a simplified, economical method of application. Unlike earlier single-action weed killers, the Bysulox Method now provides two highly functionalized liquid chemical compounds, Bysulox A and Bysulox B, which are used to produce the most complete results possible.

General Chemical Company is prepared to supply spray train equipment and experienced operators for the application of the Bysulox Method for chemical control of railway weeds.

The improved operating methods and advanced chemical techniques of our 1945 program will add materially to previous standards of weed control. Investigate this unique method by writing for free folder.



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The Bysulox Method of chemical control for railway weeds is fully explained in this new folder. Diagrammatic drawings show the simplicity and unusual advantages of the Bysulox Spray Train arrangement. See for yourself how the Bysulox Method eliminates messy mixing . . . saves time, cost, equipment and manpower. Just fill out coupon below and mail today. No obligation!

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Railroad.....

Position.....

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City.....

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REM-2

will continue to make his headquarters there as heretofore.

Karl F. Baumann, whose appointment as assistant sales manager of the **Warren Tool Corporation,** Warren, Ohio, with headquarters at Chicago was reported in the January issue, was born at Milwaukee, Wis., on May 5, 1908, and was graduated from the University of Wisconsin in 1930.



Karl F. Baumann

He was employed as a statistician with the Bureau of the Census from March 20, 1930, until he joined the staff of Globe-Union Inc., on March 12, 1931. After serving in various capacities with Globe-Union, Mr. Baumann became assistant to the vice-president in charge of sales, the position he was holding at the time of his recent appointment.

G. R. Betts has been transferred from Minneapolis, Minn., to the Chicago office of the **Armco Railroad Sales Company.** In addition to his new duties, he will continue to represent the company on the northwest accounts formerly covered from Minneapolis. Mr. Betts was graduated from the Carnegie Institute of Technology and has spent his entire business career with Armco and its various subsidiary companies.

H. F. Henriques, sales manager of the North Central division of the **Air Reduction Sales Company,** New York, has been promoted to general sales manager. **J. J. Lincoln,** sales manager of the South Central division, has been advanced to director of sales service, and **C. M. Bloodgood,** sales manager of the Pacific Coast division, has been promoted to assistant to the vice-president in charge of sales. All of the above appointees will have headquarters at New York. **H. P. Etter,** manager of the Los Angeles district, has been advanced to sales manager of the Pacific Coast division at San Francisco, Calif., succeeding Mr. Bloodgood.

Clarence E. Searle, vice-president in charge of sales of the **Worthington Pump and Machinery Corporation,** Harrison, N.J., has been elected president of the corporation, succeeding **Harry C. Beaver,** who has been elected vice-chairman of the board of directors and chairman of the management committee. **Edwin J. Schwanhausser,** vice-president in charge of manufacturing and sales at Buffalo, N.Y., has been elected vice-president in charge of sales in place of Mr. Searle. **Hobart C. Ramsey,** vice-president in charge of operations, has been elected executive vice-president, and **Leslie C. Ricketts,** manager of the Harrison Works, has been promoted to vice-president.

At a meeting of the board of directors of the **American Hoist & Derrick Company,** St. Paul, Minn., on January 22, the following changes in personnel were made: **Frederic Crosby,** president, was elected chairman of the board, and **Harold O. Washburn,** vice-president and treasurer, was elected president, succeeding Mr. Crosby. **R. E. Ljunkull,** chief engineer, was appointed vice-president of engineering; **D. B. Botkin,** superintendent of production, was named vice-president of manufacturing; and **S. M. Hunter,** manager of sales, was elected vice-president of sales. **J. F. Bishop,** manager of the order department, was made secretary and assistant treasurer, and **R. J. Henry** was appointed assistant secretary.

George M. Cooper, whose appointment as sales manager of **Eastern Railway Supplies, Inc.,** New York, was reported in the January issue, received his education at the Drake Business school and Sales Analysis institute, and then entered the employ of the Ramapo Iron Works, which later became the Ramapo Ajax Division of the American Brake Shoe Company, serving with this company in various



George M. Cooper

capacities for 26 years. During most of this period he served as eastern representative, with headquarters at New York, but in July, 1942, he was transferred to Houston, Tex., as southwestern representative of the Southern Wheel and Brake Shoe & Castings divisions of the American Brake Shoe Company. He resigned this position in September, 1944, to accept his new appointment.

Obituary

Robert F. Carr, chairman of the board of the Dearborn Chemical Company, Chicago, died in Pasavant hospital, Chicago, on January 22, after an illness of three weeks. At the time of his death he was a director of several other companies in Chicago, including the Chicago & Eastern Illinois Railroad.

Lucius Booth Sherman, who retired on pension in 1941 as senior vice-president, at Chicago, of the Simmons-Boardman Publishing Corporation, publisher of *Railway Engineering and Maintenance,* Railway Age, and other railway magazines, died in Presbyterian Hospital, Chicago, on January 24. Mr. Sherman, who would have been 82 years of age in April, had

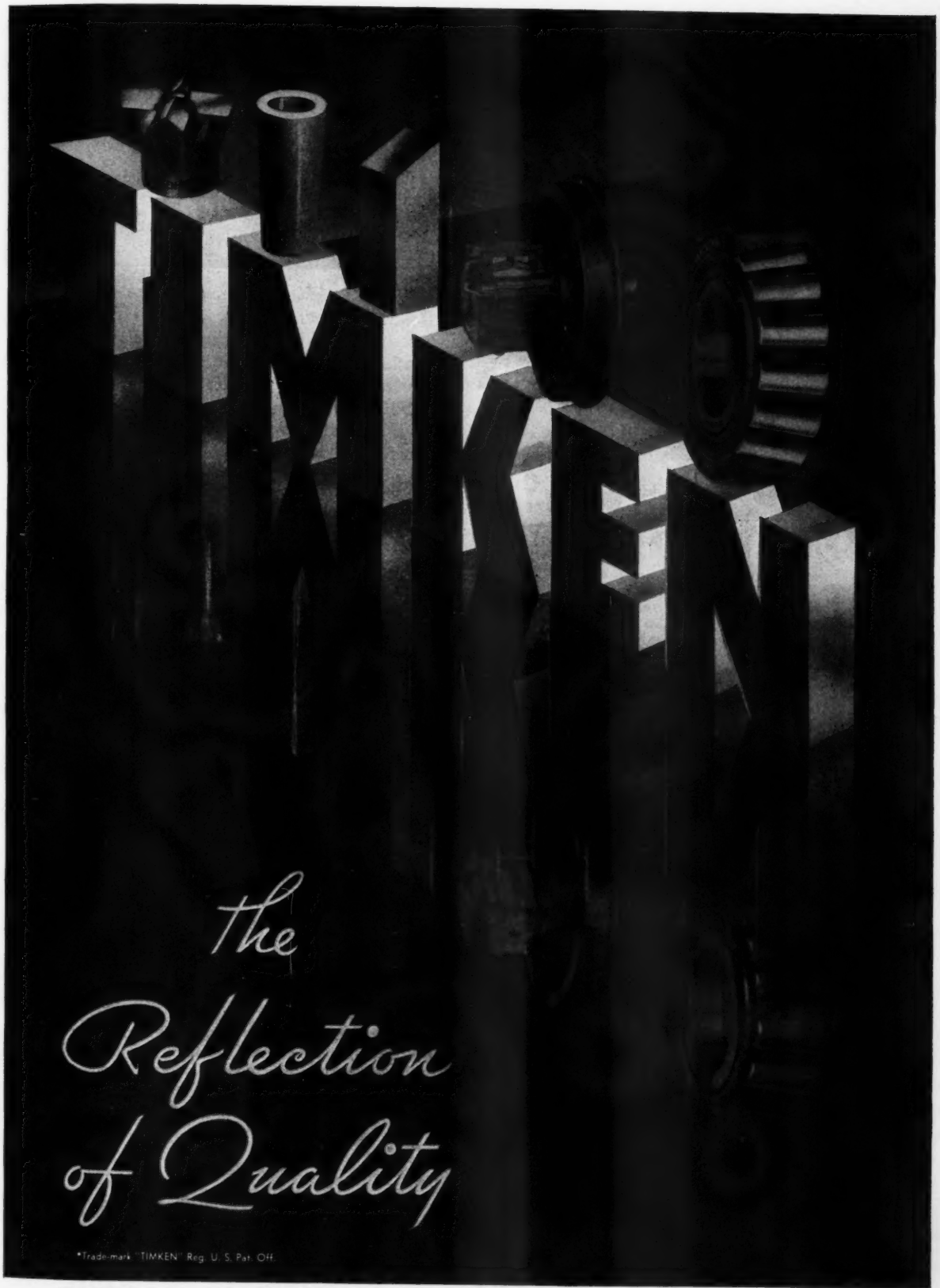


Lucius Booth Sherman

been ailing for several months and had entered the hospital in December.

Throughout his many years of activity, including more than 50 years' association with the railroads and the railway supply industry, Mr. Sherman was one of the most widely known and highly regarded men in the publishing business and railway supply field. During his career, Mr. Sherman took an active part in the Railway Manufacturers Supply Association and the National Railway Appliances Association, serving as a member of the Executive committee of the former and a director of the latter for a number of years. In 1925 he was one of the American Railway Association's delegates to the International Railway Congress at London, England.

Mr. Sherman was born in Chicago on April 18, 1863, and, after attending the University of Chicago, he immediately chose the selling phase of the publishing business for his career. In 1884 he entered the employ of the Railway Review, and soon thereafter rose to business manager of that publication. Later he resigned to become associated with the Railroad Gazette, and on November 1, 1901, was promoted to western manager of that publication. In 1908, the Railway Age and the Railroad Gazette were merged into the Railroad Age Gazette and Mr. Sherman was elected vice-president of the new company on May 9, 1911. He continued as vice-president of the Simmons-Boardman Publishing Company, which was formed in 1912 to publish the Railway Age and several other railway publications, and later was made senior vice-president. In 1930, when the Simmons-Boardman Publishing Corporation was organized to take over the Railway Review, the Railway Age and other railway magazines and publications in the building field, Mr. Sherman was elected senior vice-president of the new company, which position he was holding at the time of his retirement in 1941.



TIMKEN Tapered Roller Bearings | **TIMKEN** Alloy Steels | **TIMKEN** Seamless Steel Tubing | **TIMKEN** Railway Roller Bearings | **TIMKEN** Rock Bits

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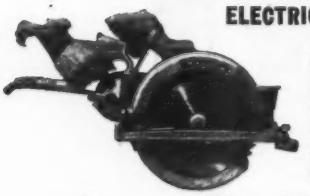


This easily portable rail grinder will pay for itself in a short time in savings on rail and road bed maintenance, reduced shock on rolling stock, and better acting and fitting switches.

The 6 H.P. variable speed gasoline engine and heavy duty flexible shafting make the unit readily adaptable to rail joint, frog, crossing, and switch point grinding. Engine starts easily, requires little attention and uses very little fuel. Unit is ruggedly constructed for long, hard usage. Patented slip-lock detail on ends of flexible shaft and various attachments reduces tool changing to a minimum.

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ELECTRIC and PNEUMATIC MODELS



A powerful saw with 12" blade for cross-cutting, ripping and beveling planks and timbers. Cutting capacity 4½" on straight cuts. Has safety guard and blower to keep cutting line clear.

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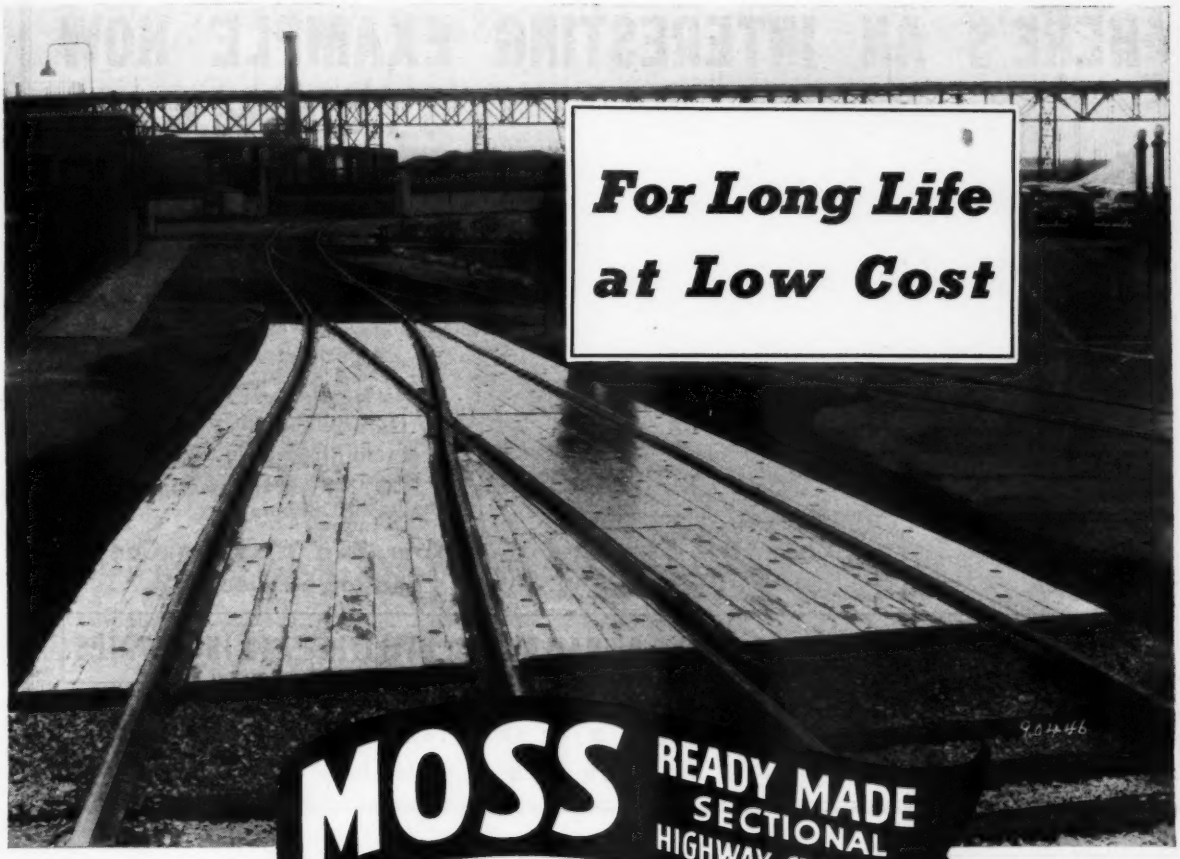


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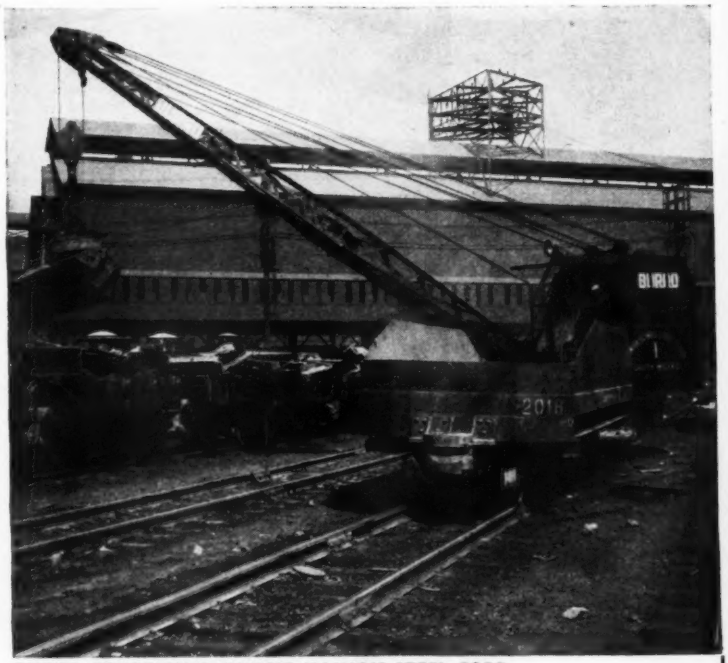
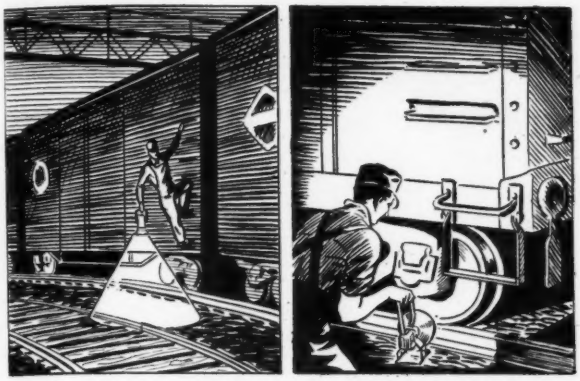


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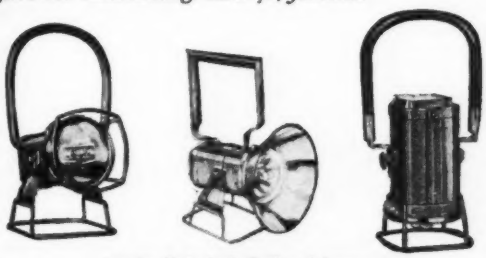
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Protect men and rolling stock from the night hazards of the right-of-way with lanterns that are specially designed for railroading. Always, Justrite!



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Three favorites among railroaders (left to right above) the All-Purpose Safety Lantern, the Inspectors Lantern and the Railroad Signal Lantern. Each one of these incorporates the famous Justrite Twin-Bulb principle . . . a flick of the switch centers and lights a new bulb instantly. They give clear, powerful beams for utmost operating efficiency; are ruggedly built for years of heavy-duty service. These are the lights that will see you through and with safety . . . Justrite.

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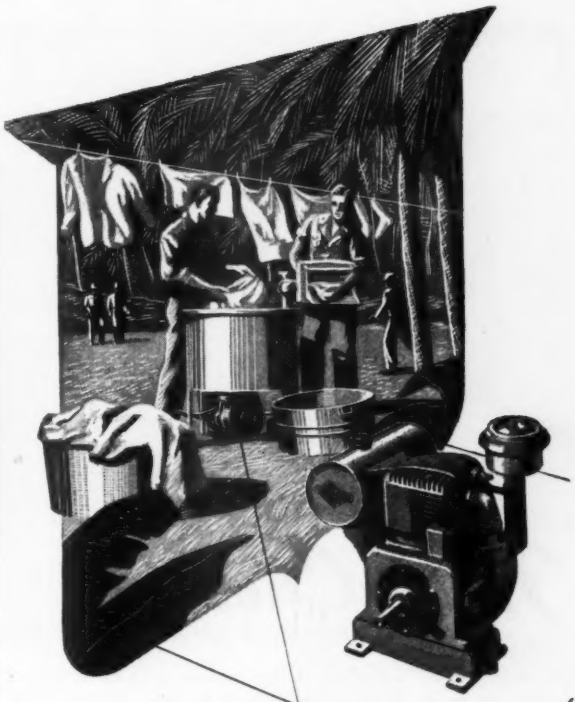
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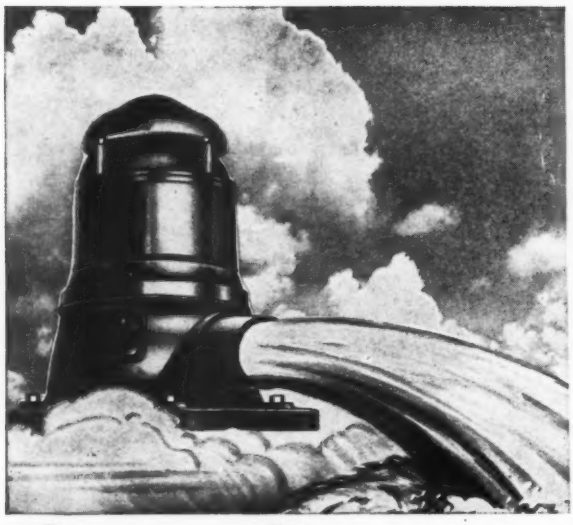


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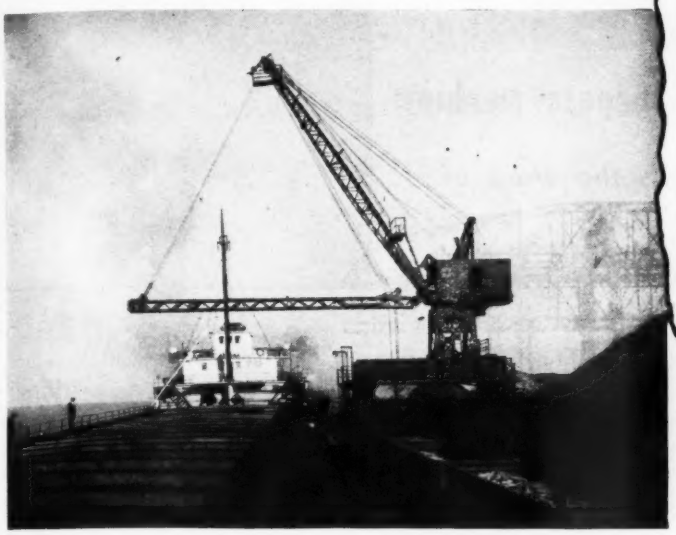
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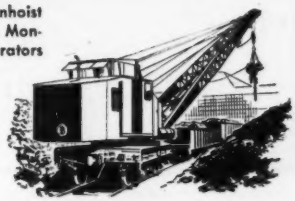


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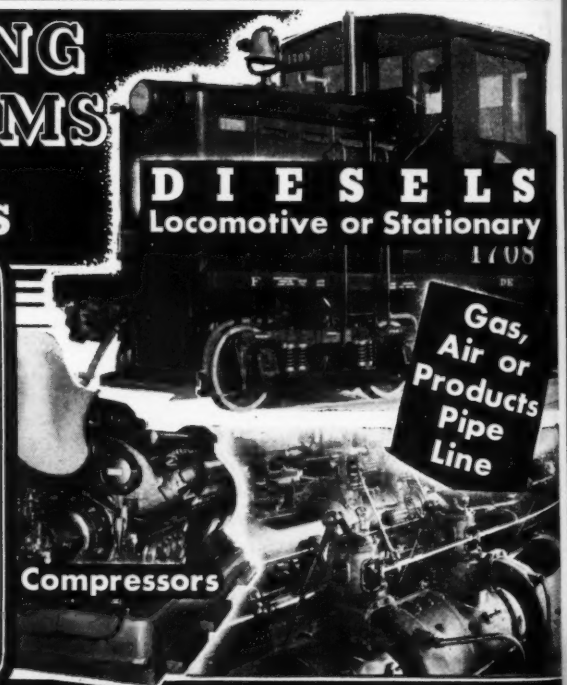
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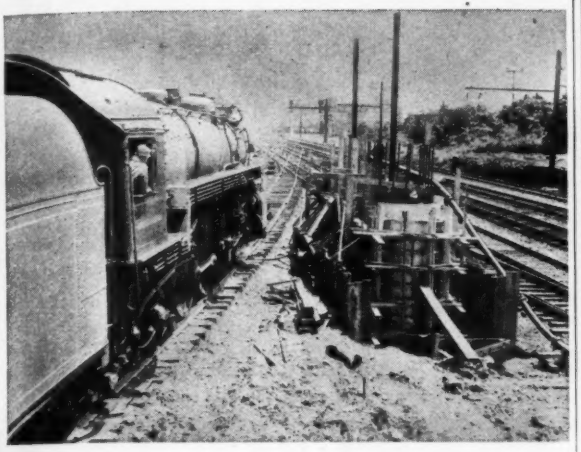
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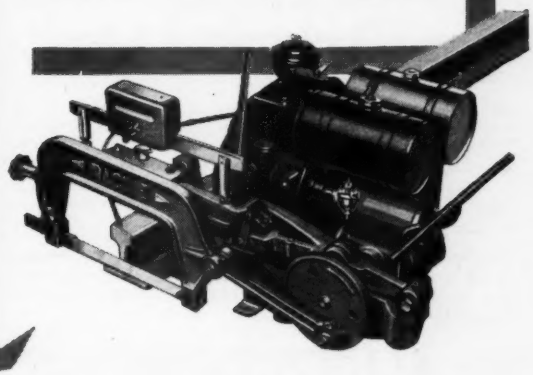
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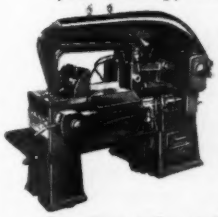
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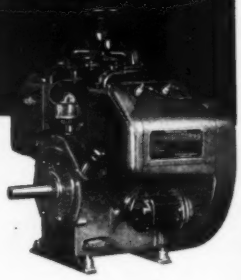
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This is a feature frequently overlooked by the purchaser of an engine . . . but it is NOT overlooked in the manufacture of Wisconsin Engines . . . built for efficiency and dependable service in *all* ways.

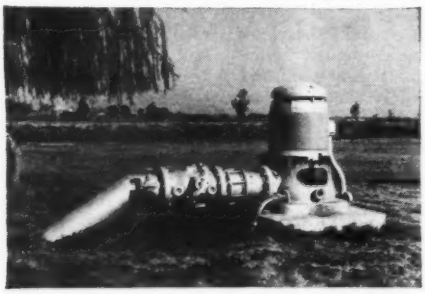
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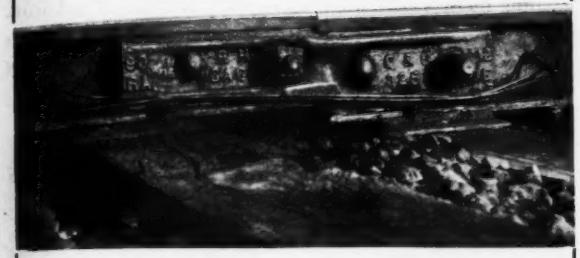


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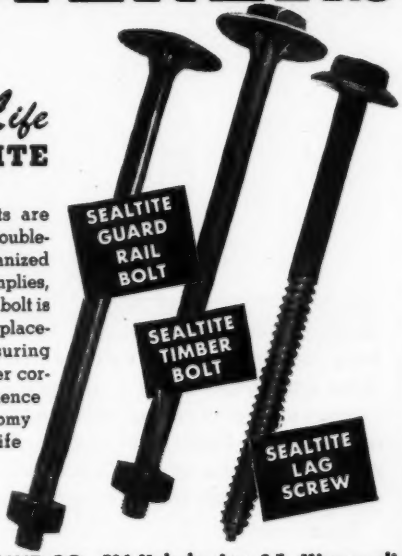
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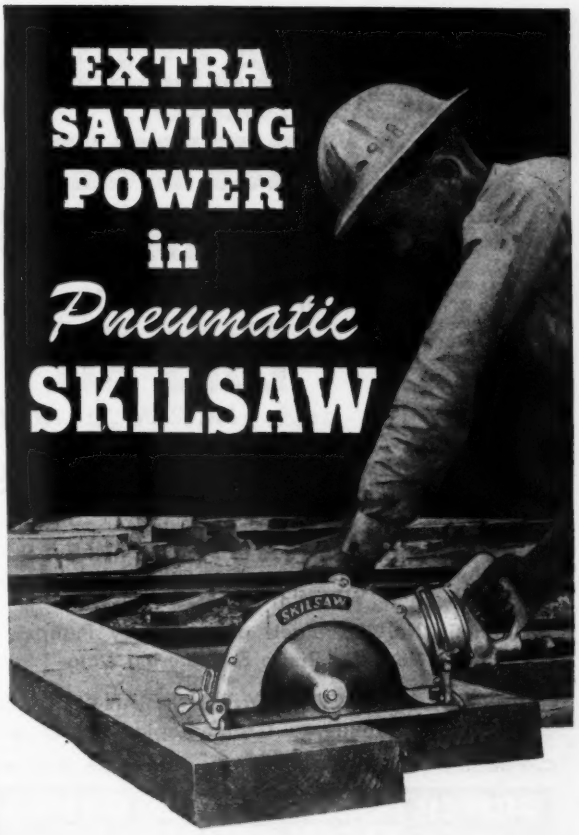
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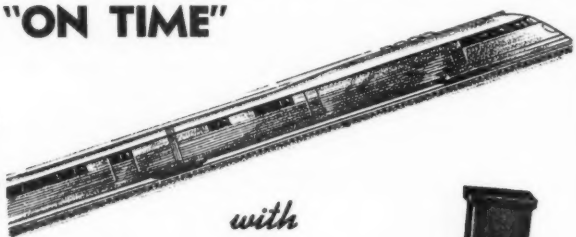
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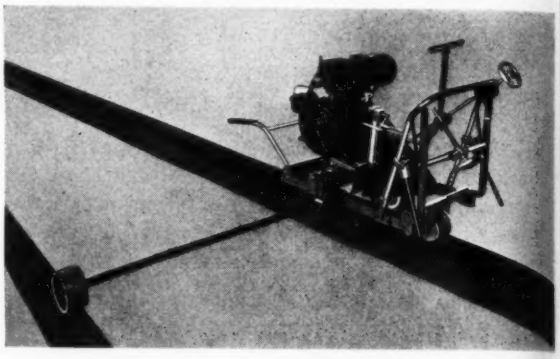


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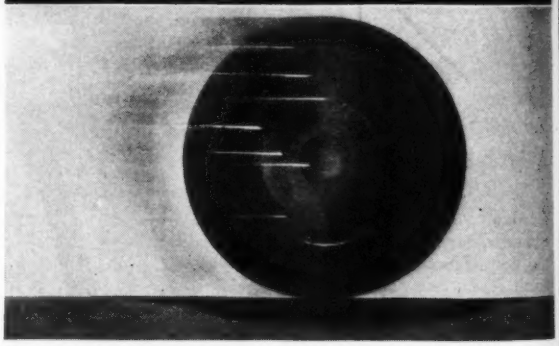
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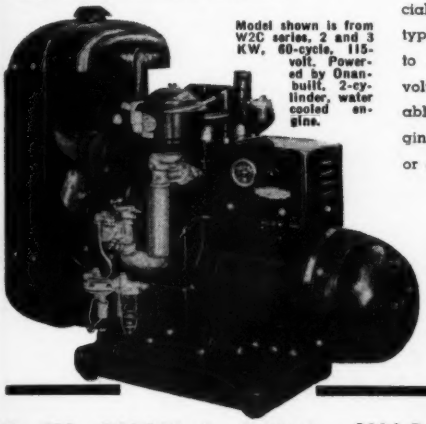
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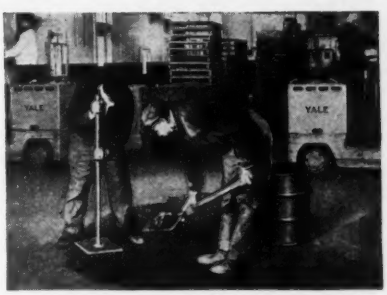
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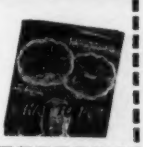
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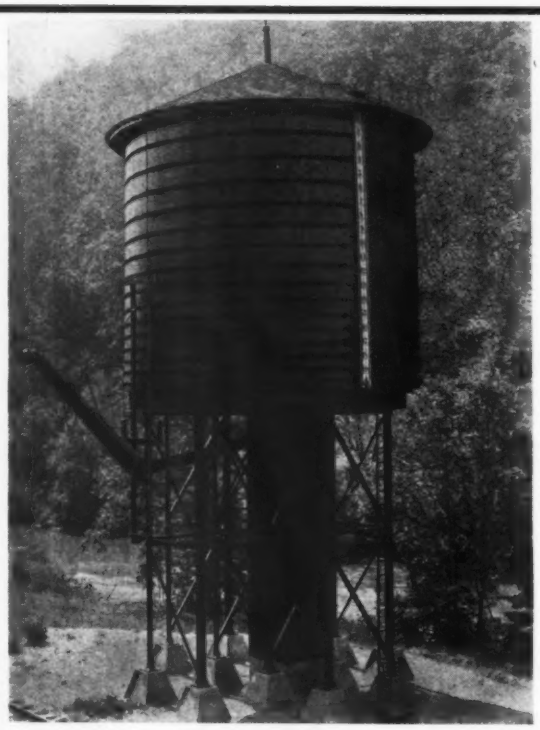
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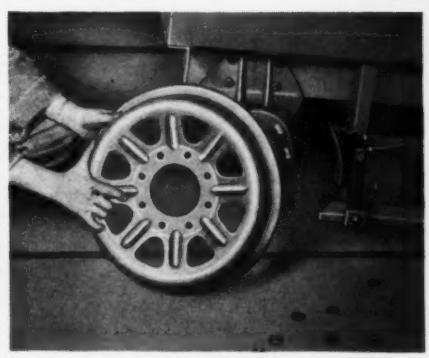
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Division of Batavia Metal Products, Inc. — 2000 Wilson St., BATAVIA, ILL.

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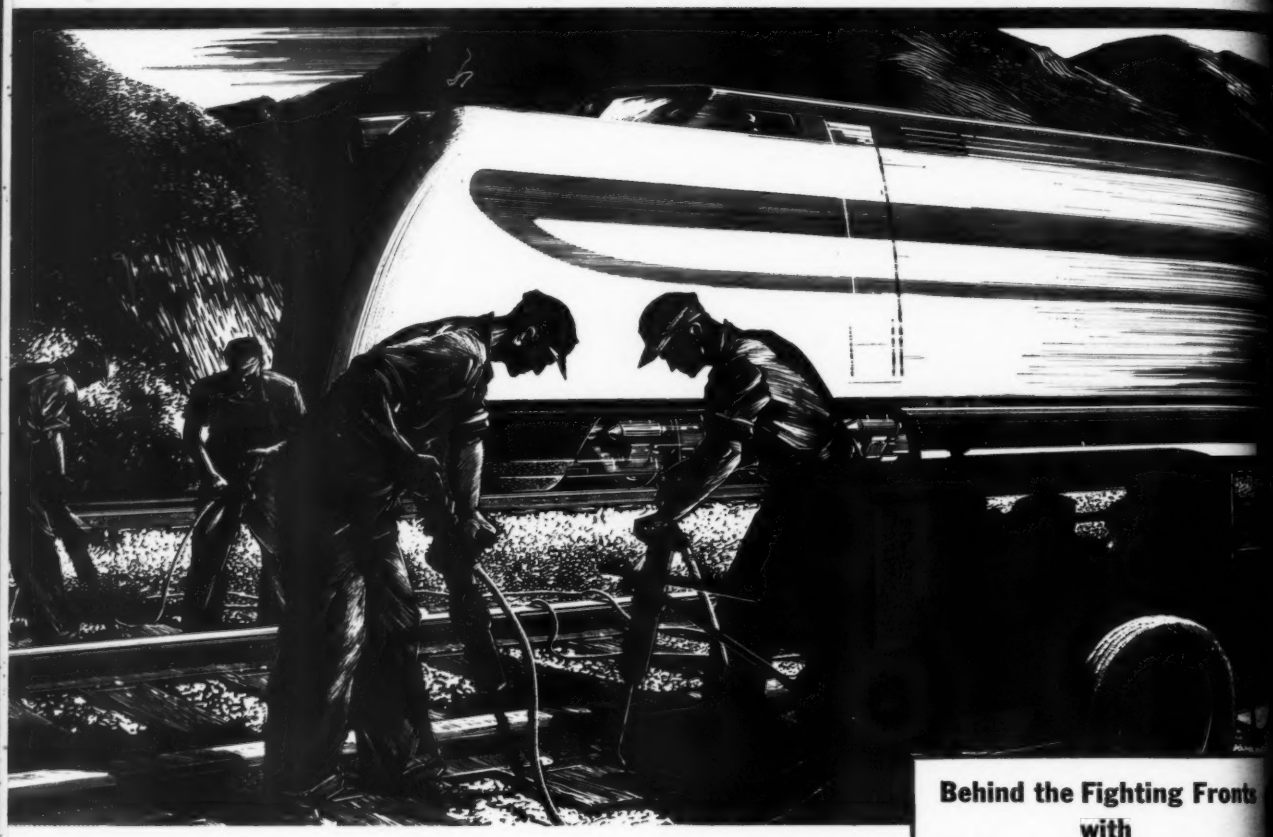
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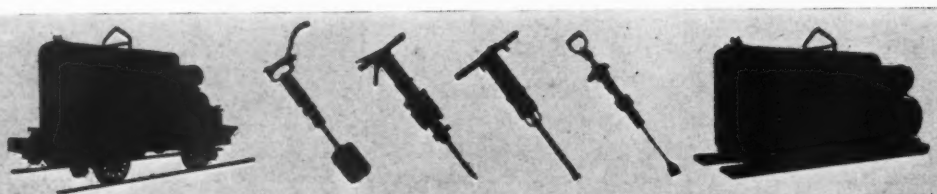
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